Outline of Draft Proposal
Republican Basin NRDs
Compact Compliance Assistance Plan for Nebraska 2008-2012

John Thorburn
6/27/07 Revised 7/9/07, 7/10/07

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B. Groundwater recharge projects
C. Streamflow augmentation projects
D. Additional reservoirs
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F. Weather modification programs
G. Conservation programs that reduce irrigation water (e.g., CREP, EQIP)
H. Mandatory or incentivized GW allocation reductions or irrigated acreage reductions
I. Water banking systems designed to improve irrigation efficiency and reduce streamflow depletions
J. Tax incentives or certified acre transfer incentives to alluvial landowners who reduce alluvial irrigated acres or transfer irrigated acres from alluvial to upland areas
K. Etc.

NRDs will enter into long-term agreements with Irrigation Districts (IDs) to buy water on an as-needed and as-available basis during water-short years. NRDs will buy water in amounts necessary to stay within depletion caps (see item #III), to the extent that other augmentation measures are inadequate to make up the difference. Any water savings derived from one or more of the projects and programs listed above that

exceed the amounts needed to keep the NRDs within their depletion caps and which exceed depletion reduction targets will be available for sponsoring NRDs to increase their irrigation allocation, or offset new industrial water uses.

III. NRDs agree to cap net groundwater depletions at current (2002-07) levels on a district-by-district basis in water-short years.

A. LRNRD= 52,000 a-f/yr.
B. MRNRD= 60,000 a-f/yr.
C. URNRD= 88,000 a-f/yr.
D. TBNRD= 000 a-f/yr.

IV. IDs are responsible for depletions resulting from storing water in reservoirs. IDs need to limit diversions to an amount equal to or less than the allocation available to groundwater users in their respective NRDs, after subtracting depletions due to evaporation. Any remaining water that is in excess of allocations or otherwise unusable by IDs should be stored either in reservoirs or in groundwater recharge projects. NRDs will compensate IDs for actual costs for use of canals and other ID facilities, to the extent that an NRD requests and an ID agrees to use excess water for groundwater recharge projects. IDs will not get paid for any excess water that incidentally recharges groundwater supplies.

V. Republican Basin NRDs and state government will establish a joint technical committee. This committee will meet a minimum of four times per year and at least two of these meetings will be at locations within the Republican Basin. The committee will consist of one representative from each of the four NRDs, one representative from each of the three BOR-sponsored irrigation districts, one representative from DNR, one representative from the attorney general's office and one representative from the UNL Conservation and Survey Division. This committee will review and approve by majority vote all data and reports submitted by the state to the Republican River Compact Commission. The technical committee will also review existing efforts to gather groundwater and surface water data and develop a plan for development of a comprehensive groundwater and surface water data collection network. The committee will also annually estimate the state allocation under the compact. An estimate will be issued by the committee on December 1 of each year. The estimate will be re-evaluated and, if necessary, revised by June 1 of the following year. Finally, the committee will work with DNR personnel to review inputs to the Republican River model and make recommendations for model improvements to the Republican River Compact Commission.

Estimate of Water Consumption Reduction Due to Improved Stream Channel and Riparian Land Management in the Republican River Basin, Nebraska

7/16/07

John Thorburn

Introduction: Nebraska will soon initiate an all-out effort to eradicate riparian vegetation growing in stream channels of the Republican River and to improve management of riparian land along that river and its tributaries. Twin Valley Weed Management Area, working in cooperation with Lower Republican and Tri-Basin NRDs, will spearhead this effort. The program will begin by spraying noxious and invasive plants around Harlan County Lake ("Harlan") and in the river downstream from that reservoir. Spraying will begin in late August and continue through September. The hope is that 3000 acres of river channel and 1500-2000 acres of lake shore will be treated this summer. Herbicide application will be expanded upstream from Harlan and along tributaries downstream from Harlan in 2008.

Twin Valley Weed Management Area will work over the long term to create a haying, grazing and logging cooperative that is intended to help landowners improve management of riparian lands. Improved land management will reduce water use by reducing the extent of mature tree cover and by improving utilization of pastures and meadows for haying and grazing. All these activities will combine to considerably reduce water consumption in riparian areas.

Recent rains have raised reservoir levels at Harlan sufficiently to inundate several thousand acres of previously exposed mudflats that are infested with saltcedar, Canada Thistle and phragmites. Sources indicate that saltcedar must be entirely submerged for at least two months before it is likely to "drown." Saltcedar may be able to survive many months of partial submersion. No data are available to indicate how long phragmites can survive total immersion, but it is likely to survive several months. Much of this land will be re-exposed as Harlan is drawn down this summer, so much of it can likely be sprayed this September.

Recent studies of riparian vegetation along the Platte River by USGS indicate that average water use by native riparian forest (Cottonwood with a shrubby understory) is approximately two acre-feet per acre per year, if the water table is within 10 feet or less from the land surface. Studies of saltcedar in the Southwestern US vary widely in their estimates of water use by that invasive plant. Water use on a per-acre basis will also vary in relation to stand density.

For this estimate, I assumed that invasive plants will consume an average of 2.5 a-f of water per acre, and that they infest 20% of riparian acres that will be treated by the program. I also assumed that land treated by herbicide will increase significantly during the next two years, while state funding is plentiful, but that fewer acres will be treated after 2009. I assume that land management improvements will expand almost exponentially over time, as landowners see how their neighbors' land improves, leading them to adopt improved management practices. Finally, I adjusted water savings estimates over time under the assumption that Nature abhors a vacuum and that even in stream channels, bare soil will be replaced by native vegetation, albeit at lower densities than was the case before management activities were initiated. Having said all that, estimating the amount of water saved in advance of implementation of a riparian land management program is bound to be nothing better than a guess. Following is my best guess. (see spreadsheet on back).

100% of river channel ds Hw + upstream to Cambridge

DNR 003672

Herbicide Treatment

Year	Land Area Treated (acres)	Water Cons. Reduction Factor	Water savings (a-f/ac./yr.)*
2008	5000	0.9	9450
2009	10,000	0.85	17850
2010	12,000	0.8	20160
2011	13,000	0.75	20475
2012	14,000	0.7	20580
2013	15,000	0.6	18900
2014	15,000	0.5	15750
2015	15,000	0.4	12600

no additional acres after 2012.

*Assumes riparian vegetation of all types consumes 2a-f/ac./yr.
and that invasive plants (Phragmites, saltcedar, Russian Olive, etc.) consume 2.5 a-f/ac./yr.
It also assumes 20% of all land treated is infested with invasive plants.

Improved Riparian Land Mgt.

Possible - JT this is more speculative

Haying, Grazing, Logging

Year	Land Area Treated (acres)	Water Cons. Reduction Factor	Water savings (a-f/ac./yr.)*
2008	1000	0.6	1260
2009	2,000	0.5	2100
2010	3,000	0.45	2835
2011	4,000	0.4	3360
2012	6,000	0.4	5040
2013	8,000	0.4	6720
2014	10,000	0.4	8400
2015	12,000	0.35	8820

*Assumes riparian vegetation of all types consumes 2a-f/ac./yr.
and that invasive plants (Phragmites, saltcedar, Russian Olive, etc.) consume 2.5 a-f/ac./yr.
It also assumes 20% of all land treated is infested with invasive plants.

2 a-f/ac water use by native
2.5 " " invasive species (may be low)
Phragmites throughout channel below H.C.

Lee Orton

NOTES
From a meeting
Between Republican Basin Irrigation Districts, Natural Resources Districts and Reclamation.
July 9, 2007

A copy of the sign in sheet and the agenda are attached to the copy of these notes in the file. [The plan for the meeting was to keep the list of attendance limited to one person from each district and Reclamation limited to their Regional office, Grand Island Area office and McCook Opeations Center. Attendance by others was not prohibited, but it was clear that some rules of engagement need to be finalized for future efforts. No one who arrived to sit in the meeting was denied entrance.]

- Introductory remarks summarized the procedures required by Reclamation and the irrigation districts to provide for Compact water deliveries from federally owned projects. This included issues with environmental compliance, water releases identification for specific project purposes, accounting for released supplies which will not harm other project operations and protection of authorized project purposes.
- Emphasis was made that Reclamation projects are not for sale and Bostwick and Frenchman Cambridge announced that current plans do not provide for sale of water supplies in 2008 [projects plan to deliver irrigation water to water users in 2008] Discussion regarding sale or adjustment of project purposes on Reclamation projects occurred noting time and detail necessary to accomplish such an effort.
- Comments were made that Compact compliance would take precedence over other laws and project obligations and that the State could require changes in operations of projects and private water users ultimately to accomplish Compact obligations.
- Comment was made that water in the river was a necessity if sustainable resources are to be achieved and essential for Compact compliance as well.
- Comment was made that sustainability was not necessarily synonymous with Compact compliance.

Issues and Activities raised for which further work is required:

- Whether purchased project water can be used for bypass flows to Guide Rock. [Reclamation is investigating their position on this issue.]
- Whether project water might be purchased from individual irrigators for use in compliance. This includes not just legal issues, but economic and technical issues as well. [Work on this option will need to be a part of future integrated management discussions.]
- Need to develop a procedure and action time line for development of water marketing agreements which include provisions for third party influences and inputs into any such agreement plans. Identified because of the late hour determination which have been a part of every past Compact water marketing

agreement and the need for water user certainty for their annual cropping plans. [Districts and Reclamation will work on this procedure to avoid 2008 late actions if needed.]

- Review of methods for computing what is being acquired and what can be protected for delivery downstream from acquired supplies [This involves further discussion of difference of opinion at the State level and impacts of those actions on downstream projects and Reclamation.]
- Verification of State or other governmental rights and responsibilities in compliance with the Compact and authority to require releases from project facilities and authority to reduce or restrict ground water withdrawals to satisfy Compact obligations. [State (AGO) needs to provide its research on this issue for further review and discussion.]
- Need to fulfill "modeling" alternative examination using State capability or development of District capability to conduct alternative scenario examinations. [RRBA counsel to make private contacts for costs involved in District completion of possible modeling tasks.]
- The need to find "wet water" resulted in suggestions for the following possible long term activities together:
  - ✓ Implementing of water conservation practices on irrigated lands
  - ✓ Integrating supply uses
  - ✓ Water marketing methods and practices
  - ✓ Water use direction [requiring use of ground water or surface water in individual cases]
  - ✓ Development of a unified water supply
  - ✓ Water augmentation options
  - ✓ Vegetation management practices

Further meetings were not scheduled but will likely be necessary. A protocol for calling of such meetings and rules of engagement are necessary and will be discussed among District leaders.

##

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July 16, 2007

I am attending a legislative leadership conference in Wisconsin and find it impossible to attend the July 18th meeting in Cambridge.

There are a few concerns I have as we move forward to continually address the water issues of the state, particularly those of the Republican River basin. Two basic goals are sometimes in competition with one another. The primary goals are:

1. Compliance with the compact.
2. Long term sustainability.

A positive fact is that Governor Heinemann, Director Bleed and the DNR, the affected NRD's and the legislature all understand the importance of working together to develop a workable plan to enable success. I am using this letter to express my concerns about how we proceed to attain these worthy goals.

We could say this effort should have taken place twenty years ago, but, it is much better now that later. I believe the urgency for action must be implemented with plausible steps that are reasonable and not financially devastating to any area of the basin. This is a necessary, fundamental consideration.

WATER ALLOCATIONS

I read the North Platte NRD has decided to implement an 18 inch pumping allocation. In comparison to the challenge for the Republican basin, in my opinion, 18 inches is a "feel good only" plan. It needs to be in the 12 to 14 inch area to be meaningful. An 18 inch allocation is of very little value and an insult to the Republican basin.

Two approaches can be taken to compliance and sustainability. One is to start at the bottom, severe level and work up. This may lead to quick compliance, but I believe it will be devastating economically. The second approach is to start at our current levels of 11 to 13.5 inches and work our way down to compliance and sustainability. I believe this may be a more stressful route for the State of Nebraska, but less stressful and much more acceptable to the citizens of the Republican basin. This approach should carry with it a much lower probability of financial devastation.

I will encourage that any fine tuning to the current level-down approach take other factors in to consideration:

1. Which areas have experienced a decline, no change, or an increase in ground water levels in recent years?

2. Which areas have been the best stewards of water use in the past several years?

3. Which areas have increased or decreased irrigated acres in the past several years?

4. Which areas have made the greatest positive contribution to Republican River flows in the past several years?

Thank you for your attention to my concerns and your contribution to our cooperative effort to reach compliance and long term sustainability in the Republican basin.

Tom Carlson

Republican River Planning Group Meeting

June 22, 2007

DNR 003680

Overview

- New Model Runs
  - Average Conditions
  - Dry Conditions
  - Projecting the NE Compact Allocation
  - Determining the reductions needed to stay within that Allocation
- Review Basinwide Planning Document

30 precip gages

Is a small down adjustment to amount than could pump for Cert. acres

Use 2005 acres not certified acres.

based on pumping full allocation

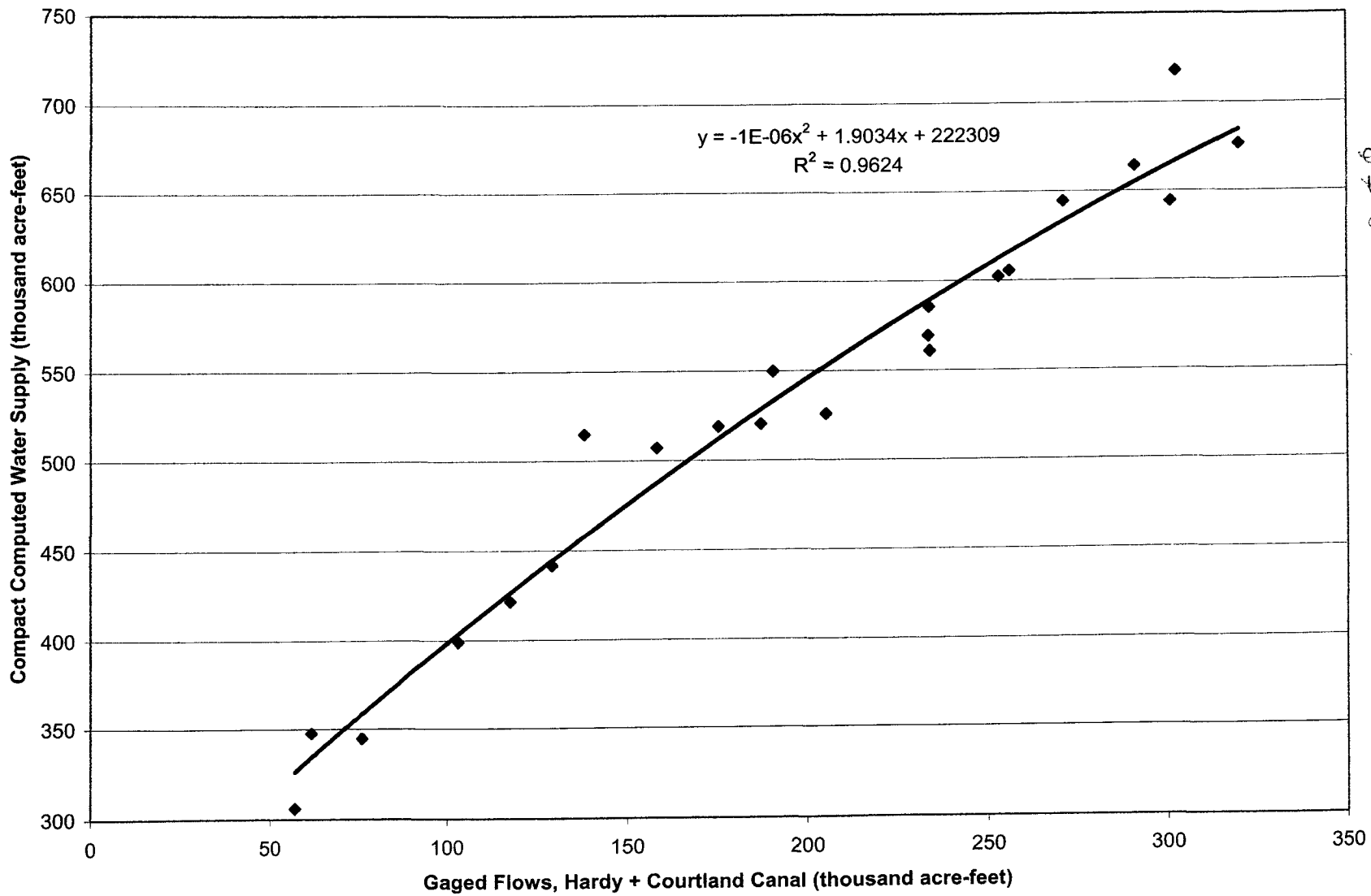
DNR 003681

New Model Runs

- Two new sets of modeling scenarios have been completed
- The precipitation record was analyzed and the following statistics computed for each gauge:
  - 50th Percentile (similar to average) – Average Scenario
  - 35th Percentile – Dry Scenario
- Model was run repeating these rainfall values for 40 years with the NRDs pumping their full allocation

DNR 003682

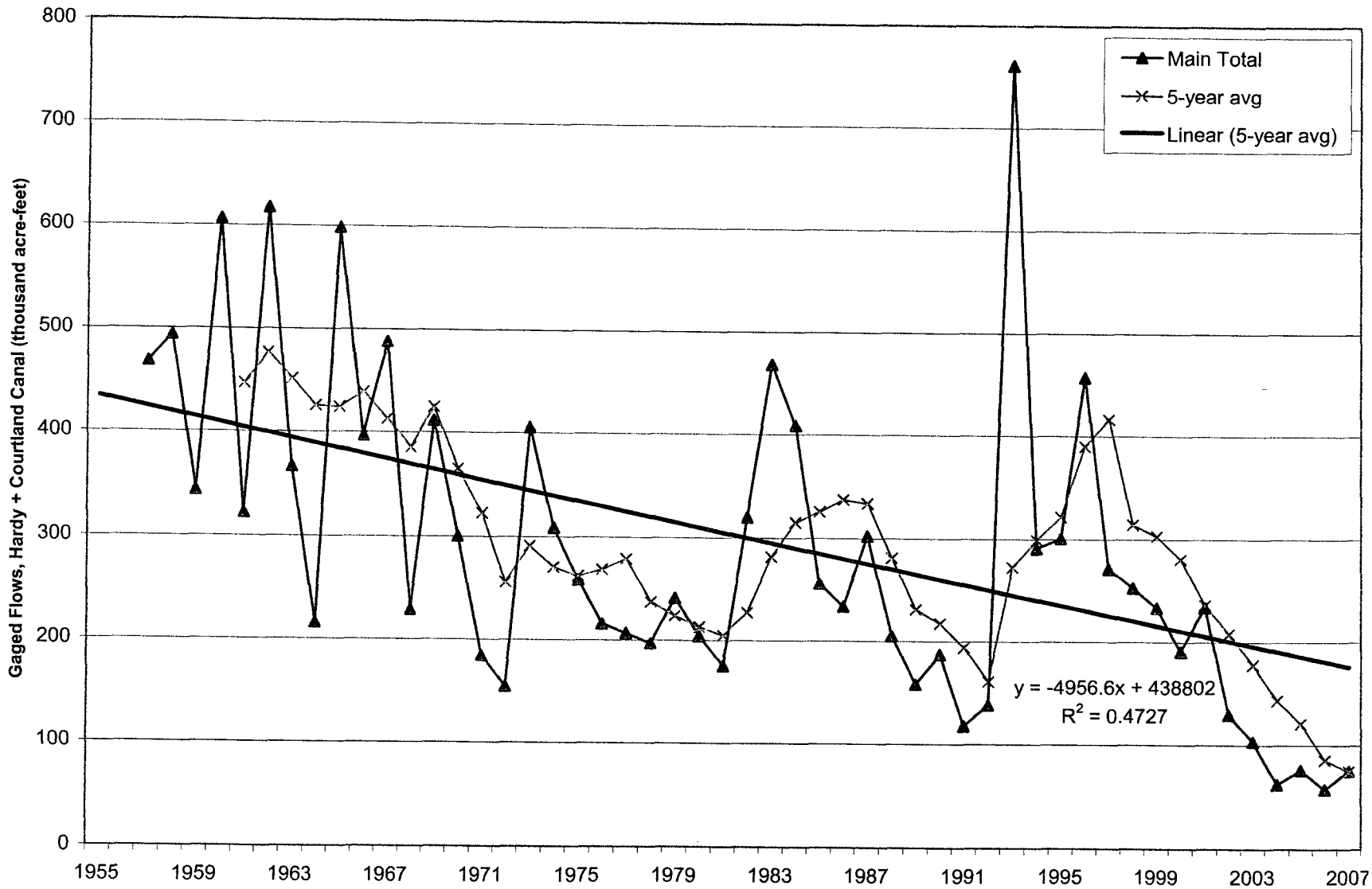
Projecting the NE Allocation



EOY this year alloc 220KAF

DNR 003683

Projecting Future Streamflows



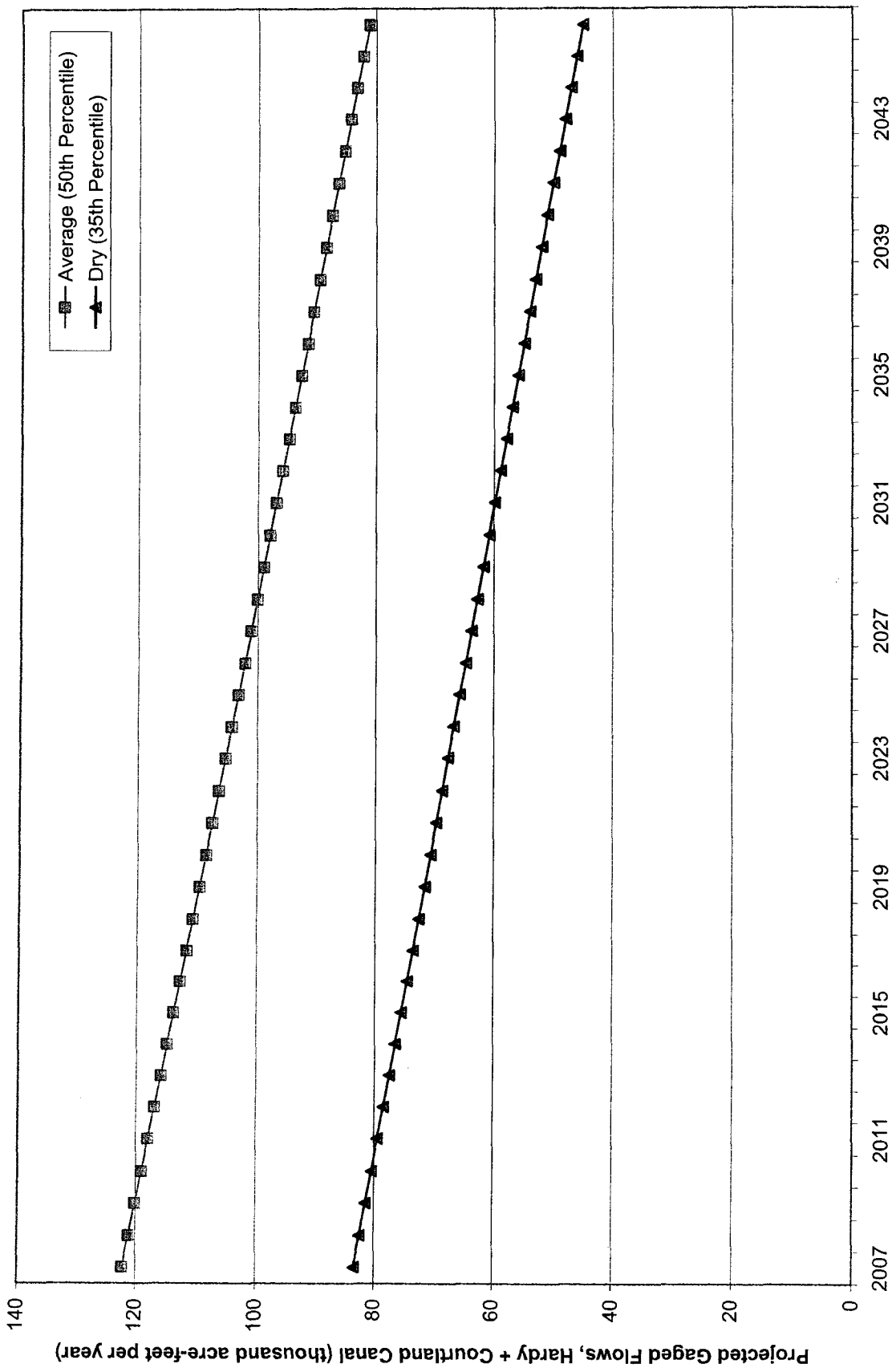
DNR 003684

Projecting Future Streamflows with Current Allocations/CREP/EQIP

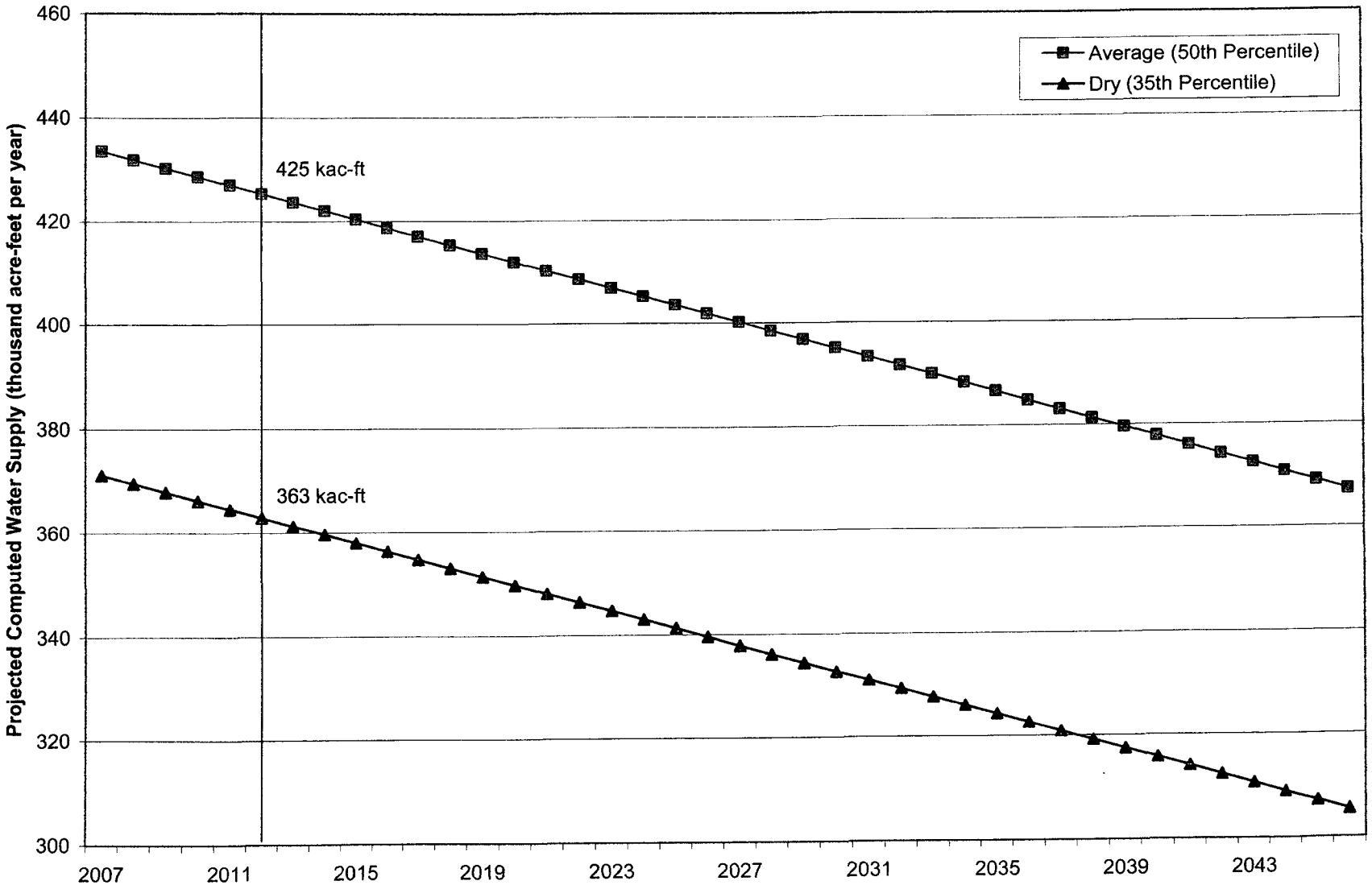
- Use 50th (average) and 35th percentile flow from last 50 years
- Adjust for the trend in streamflow
- For future years, subtract the modeled annual reduction in baseflow
  - 1054 acre-feet per year (average)
  - 983 acre-feet per year (dry)

DNR 003685

Projected Streamflow

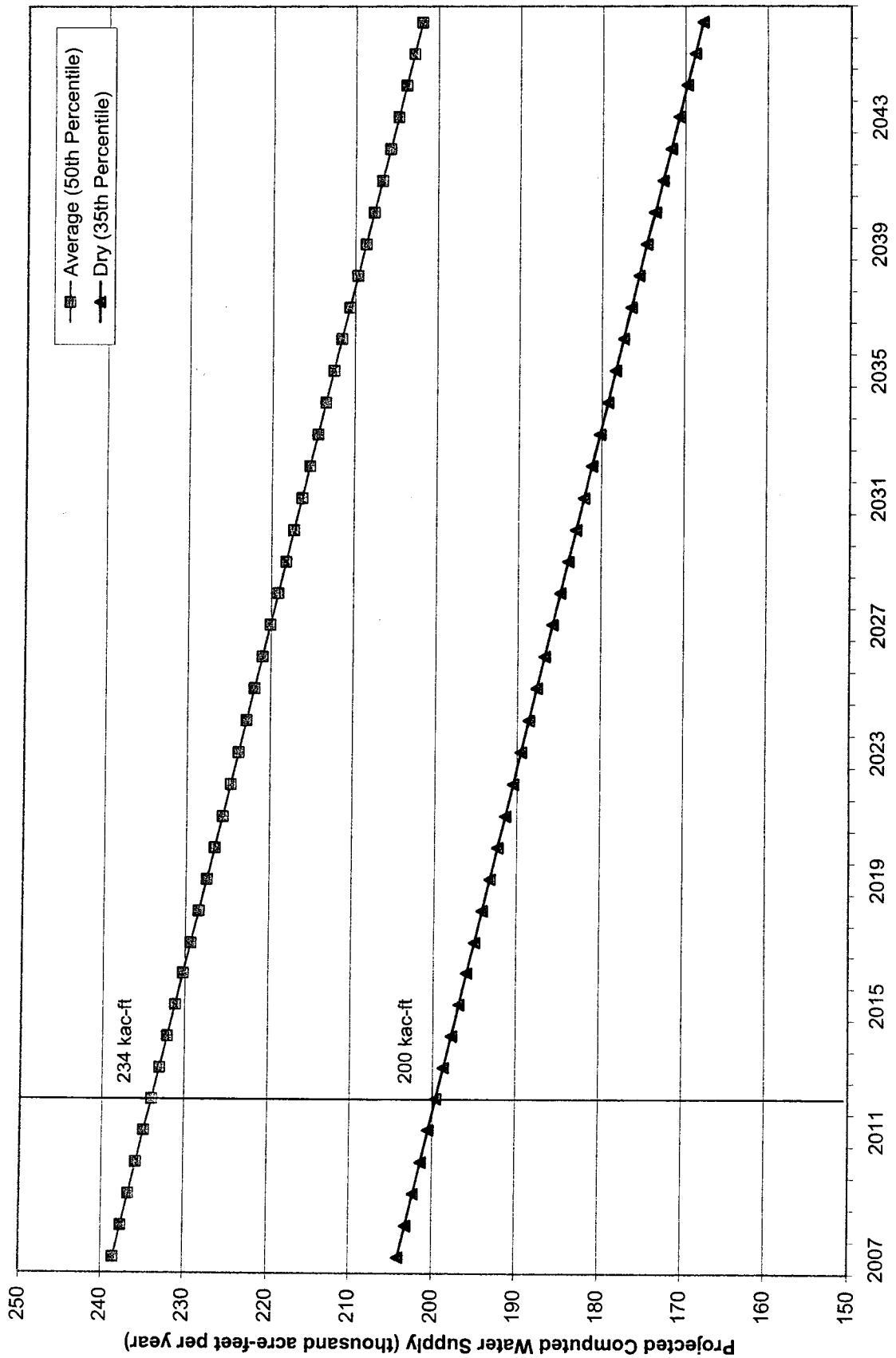


Projected Compact CWS



DNR 003687

Projected NE Allocation



Determining SW and GW allotment

- Added 10,000 acre-feet per year to the allocation for the Mound Credit
- Subtracted 25,000 acre-feet per year from the allocation to account for reservoir evaporation
- Divided this between SW and GW using the 98-02 average split in consumptive use (27.5% SW, 72.5% GW)

DNR 003689

Allocation Adjustments

- Governor recommends using the dry scenario for a three-year allocation.

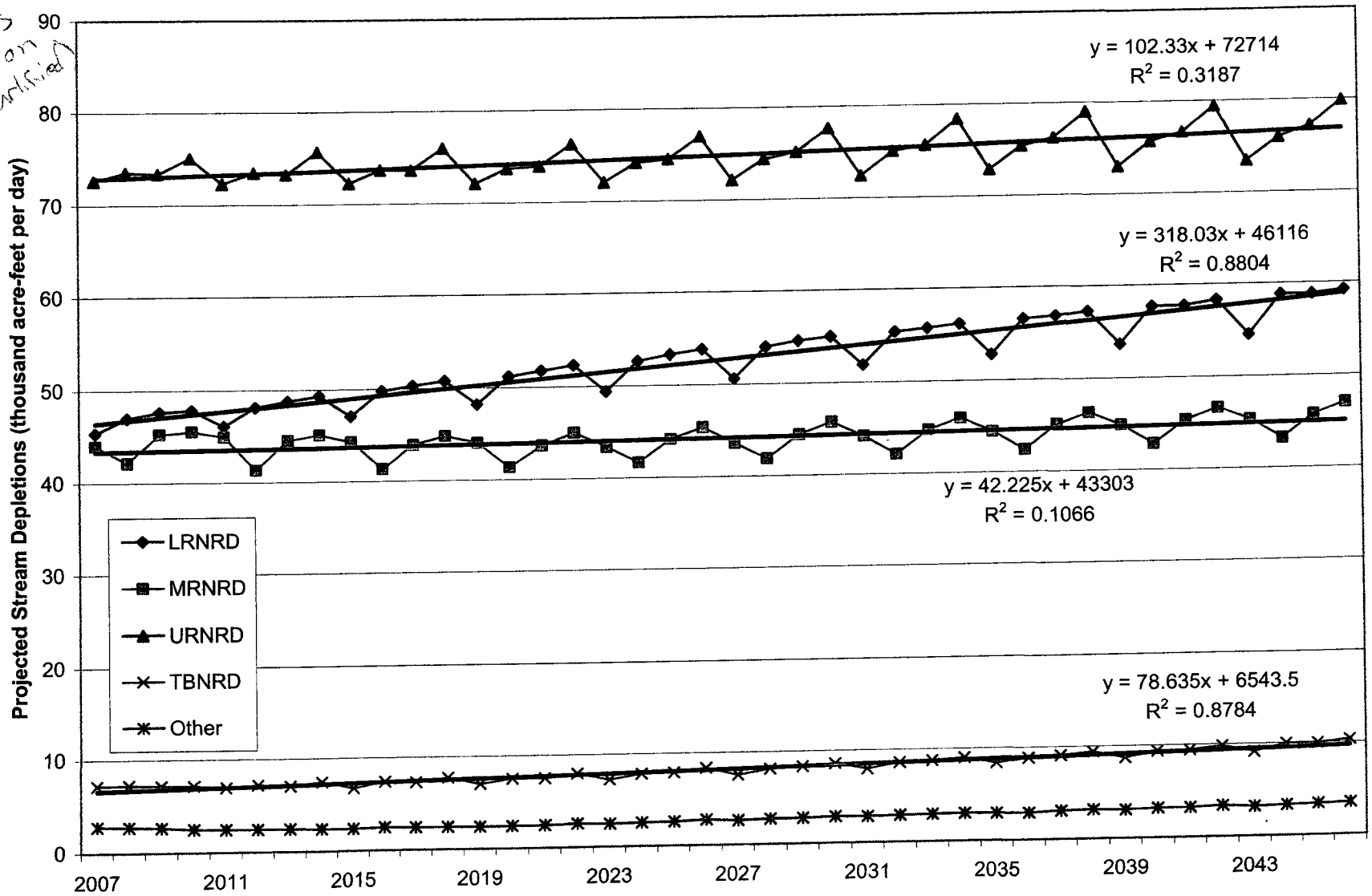
- Allocations may be raised by augmentation plans implemented by the NRD's.

DNR 003690

Impacts on virgin supply only

Projected Depletions - Average

current allocations
Daily pumpage on irrigated (not certified) acres.



10.5"/LR
12.5" MR
13.5"/UR

DNR 003691

Determining NRD portions of GW allotment

- GW allotment is 159 kac-ft under average conditions and 134 kac-ft under dry conditions in 2012
- Splitting this up using 26% to LR, 30% to MR and 44% to UR, for 2012

	LRNRD	MRNRD	URNRD
Average	41,300	47,600	69,900
Dry	34,800	40,200	58,900

DNR 003692

185,000 allowable
80

195,000 allowable
MRD

Proposed Allocations

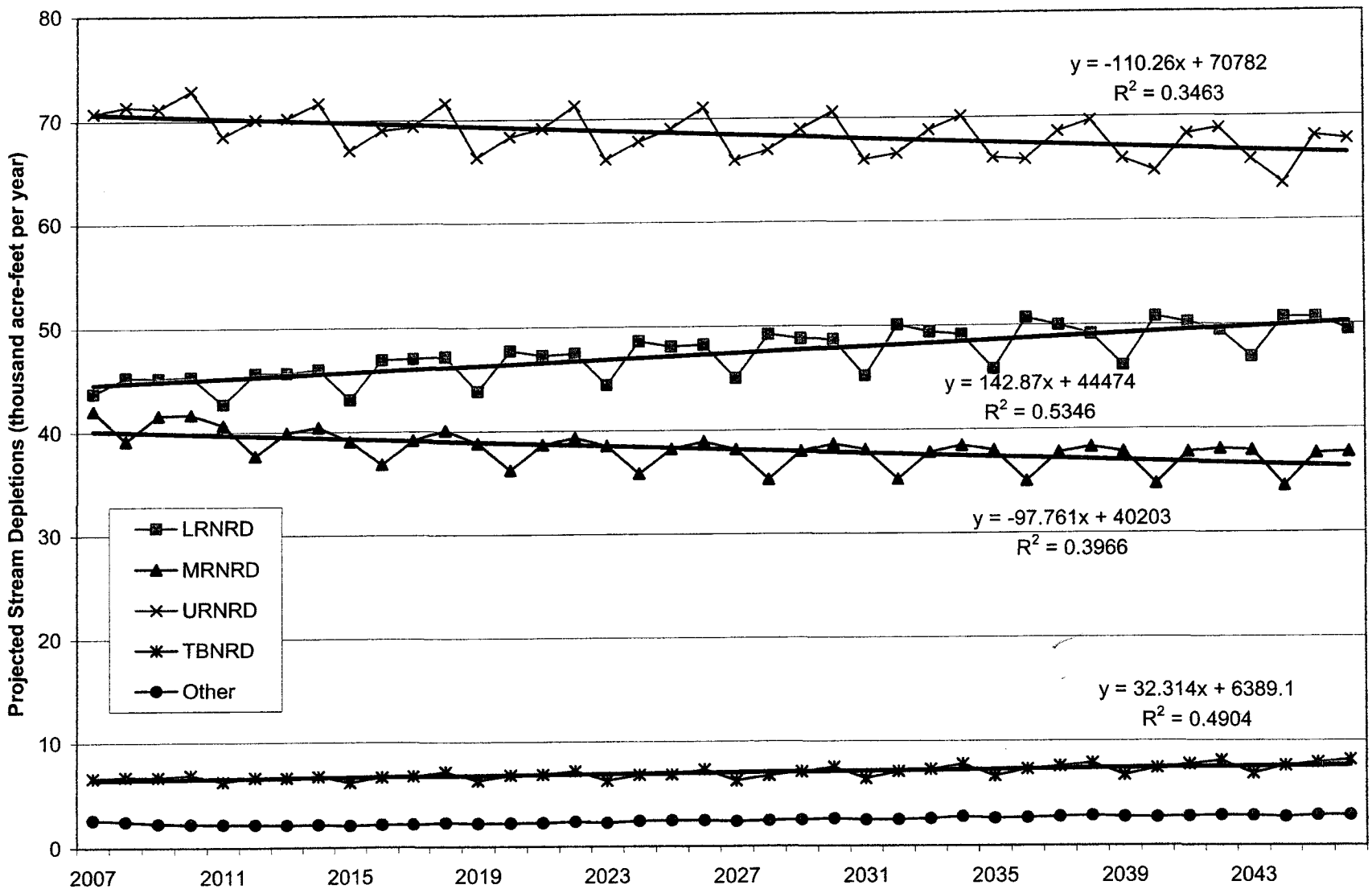
Scenario	LRNRD	MRNRD	URNRD
Dry	3.5 5	5 6.5	5.5 7.0
Average	6.5	8	8.5

Pumping Percentages

Scenario	LRNRD	MRNRD	URNRD
Dry	22%	30%	48%
Average	25%	29%	46%

DNR 003693

Projected Depletions - Dry



DNR 003694

Rep. Managers
Planning
6/22/07

I told group I had asked Ken R. not to come. Don't upset.

JT wanted to read mailing
Justin - no

Pumpage new model different than has been in past when use actual pumpage. Those runs use allocation in inches/acre x # acres irrigated. This is a bit less than 11/acre x certified acres.

Based on Jim's calcs of ~~220~~ streamflow v alloc - v assuming from July → = last years flows ⇒ 220KAF ∴ probably conservative.

Historic stream flow has downward trend so had to correct $\bar{x}$ to account for historical trend.

80% of water in terraces ends up as recharge small dams - ~~increase~~ decrease.

Sen Carlson - I must figure out not what we want to have but what we have to have. Can't exist with loss. must be able to realistic
Vegetation - can help.
we have to get sustainable. Is a hard fact level. But we can't go on doing what we're doing last 50 yrs.

Can't back down from lower what was done in Dec.

Sw guys want evap in 4 runs so NRDs don't split.

Allocations McCook - 200 KAF
Lesh policy -

DNR 003695

Jasper - if UR had pumped 13.5" would be at 95% tempt
Not true for LRNRD

Jasper - Sw buy out as short term shock absorber
Long term will be closer to average.

Sw By = 3" allocations for dry years.
Under X scenario 8.5" + sw lease ⇒ 3 11.5
only pump 90% allocation ∴ add. 1"
=12.5"

Look at where we are at + what

(NRD's + Irrigation Districts work together

If there is a sw buyout
Buy at QR
Vegetations

Sw/Gw - NRDs will work on perm buy out proposal by August
Program - CREP2 + (Michael Clements)
Look into.
John T-

JT MKT scheme move acres to upland away from QRW

RS - Reclamation views these water purchases to be a temporary thing - not perm + long term

KBID won't be short & water next year -
if KBID doesn't have a place to put it -
buy out won't help 2008.

CREP on ID - still have to pay ID payments

Sen X - years to year buyouts won't work - needs to be a long term solution.
X in Lincoln sold - would have a long term buyout

John T - CC - intentional recharge.

NRD + DNR - dam -

Model review -

10:00 July 31. TB NRD

10:00 Aug 13 H

2006 33,211 in hole

AL 2006 183,550 CF 228,950 IWS 12,189 -

Caveats

2003	28,000
4	37,000
5	42,000
2006	33,000

75 2005 + 2006

Q+A Baseflow run off - what was it, is it.
At different allocation - how much SW avail.
Retire X acres - how many.

ROGER KOLBET — H.R.W. RIVERSIDE — CKOLBEATSOL

Don Feldt — Fr Valley H&RW — McCOOK

Maria Trompla — CNPPID — (mtrompla@cnppid.com) Holdrege

Kristi Lauer — ACO

Bill Box — Lower Republican — Orleans

MARK CHRISTENSEN — Senator — Imperial

DNR 003698

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Lee Orton	RBIDC	lee@hzobay.net
Ray D Wurz	TRI BASIN NRD	
Clarence Jonkouts Jr	Frenchman Valley	

	Allotment		why the difference
U	60 - 48	12	= 2 g whole — = same
M	41 = 33	~~8~~	2 g dep.
L	36 - 28	~~8~~	

Proj Dep

$\bar{X}$

		Dry
U =	102x + 7200	−110x + 7000
M	42x + 4300	−97x + 4000
L	318x + 4600	+142x + 4400

~~All / with~~

Use same scale

Middle gets most mound - dep inc faster
Lower benefits ? precip + up stream water
so depletions ↓ in dry times

DNR 003700