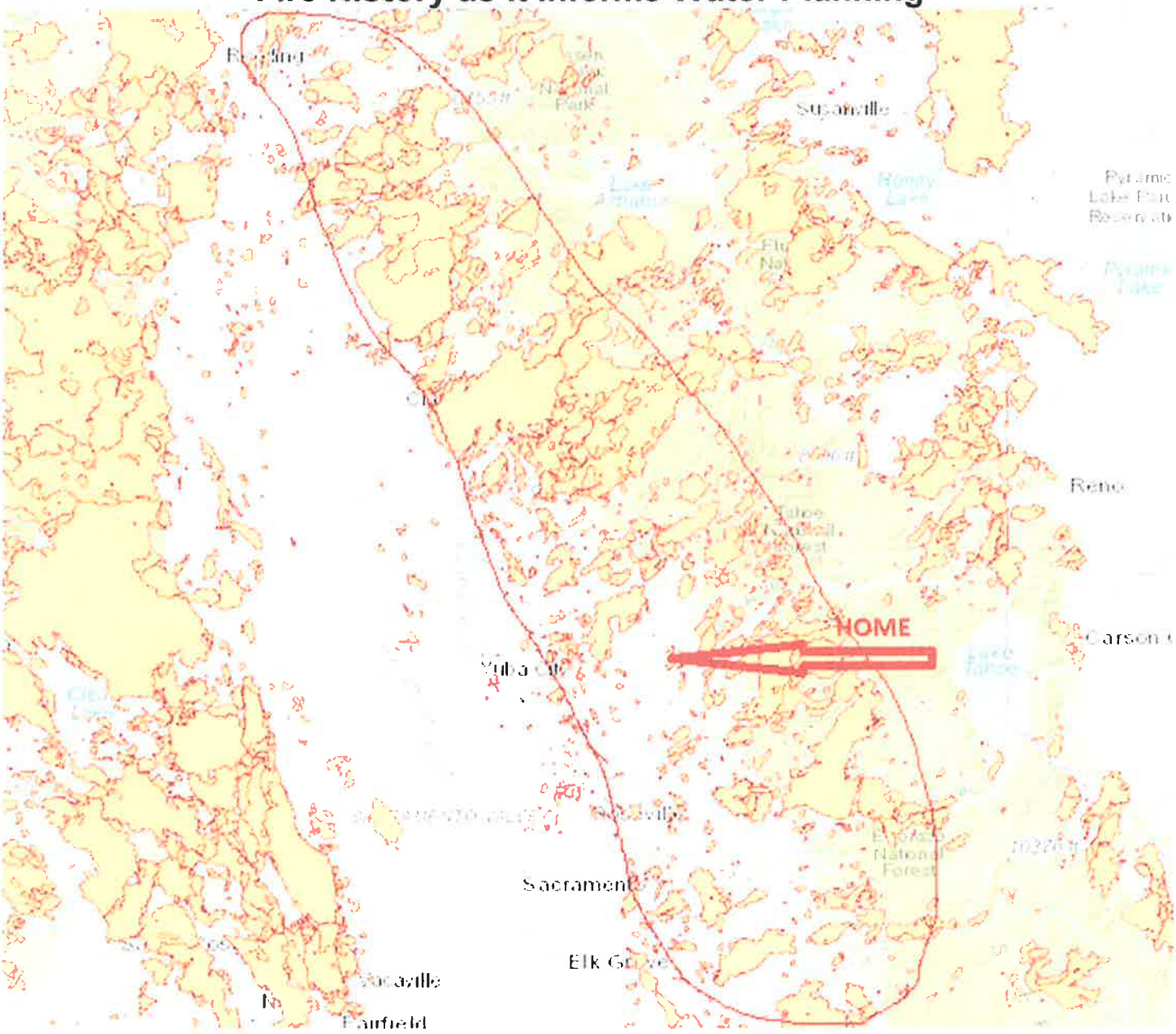
Fire History as it informs Water Planning

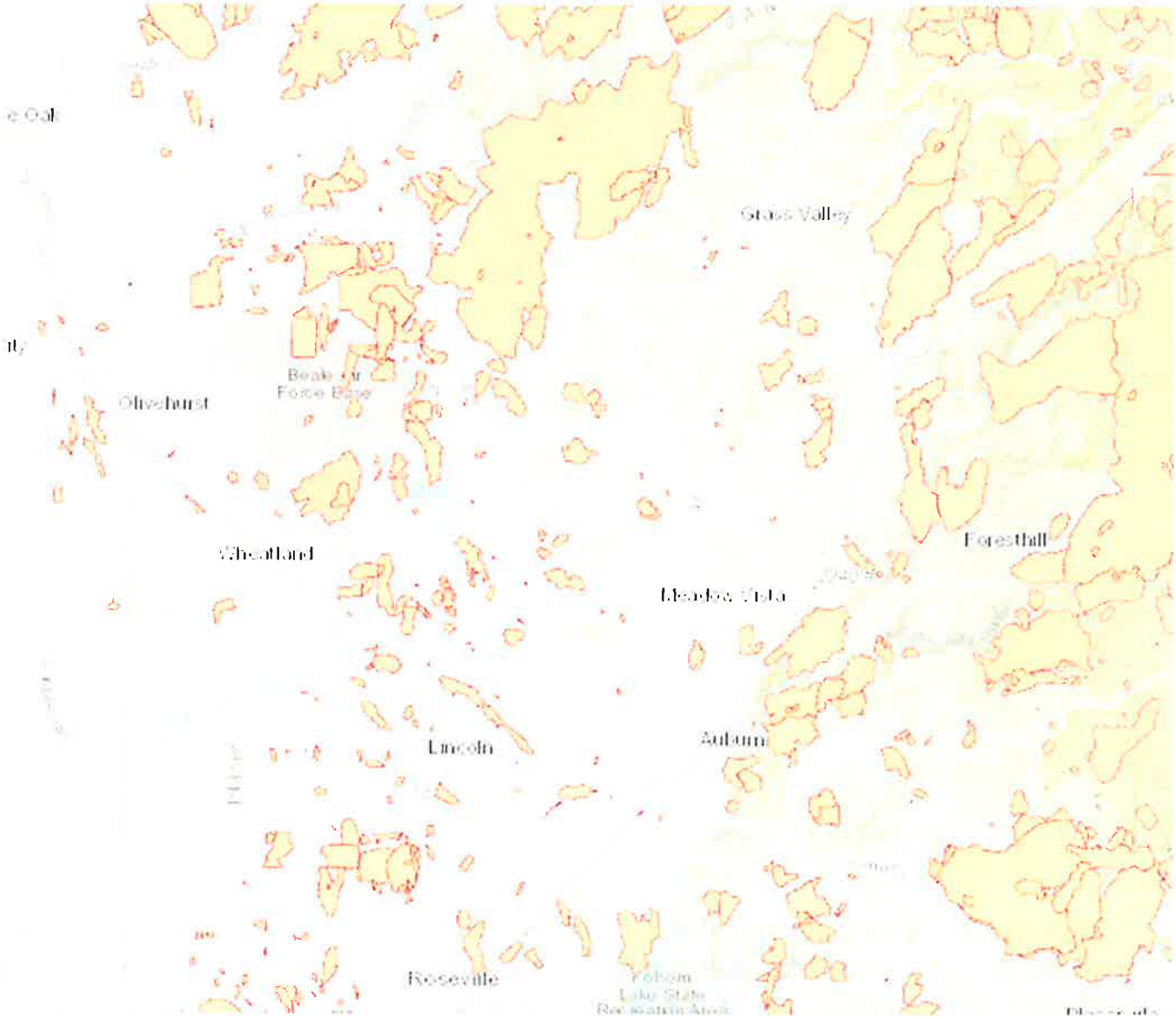


This map shows fire history over the past 120 years. Circled in red are Sierra foothill elevations from 500 ft to 4500 ft. There are very few areas that have not burned in the last hundred years. Our home between the Yuba River and the American River is one such area that has no significant fire in over a century.

That's why our forests look the way they do--- even aged grand trees, which we have trained our mind's eyes to see as beautiful and natural. Actually, it is quite unnatural--- crowded canopies with overgrown understory, and a perfect prescription for fire of devastating intensity.

This unburned area will burn, especially now that climate change has exacerbated conditions with greater heat, lower humidity, lower soil moisture, longer fire seasons, and wilder winds. The mega fires of the past decade tell us how our home will burn....

UNLESS, we do fuel reduction, fire safety retrofitting for all structures, aggressive defensible space, networks of fire breaks, and reintroduce prescribed burning to the greatest degree possible. If we don't, we don't just risk catastrophic fire, we invite it. So far, our community has barely scratched the surface.



What does this mean for water planning? The paradigm shifts:

1. NID owns a lot of land. As a landowner, every acre needs to be managed. Zeke Lunder of The Lookout estimates that it takes $1000 per acre every year for 10 years to get from intensely over-fuel loaded forest to a state where prescribed burns can be the primary management tool. Every landowner needs to start NOW. The cost of managing NID's large land holdings to acceptable level is annually enormous.

2. Fundamental means of delivery will need to be re-designed. For example, it may simply not be feasible to deliver water by means of wooden flumes in forests. Think South Yuba Canal. It may mean:
    a. Tunneling most of the distance from Bear Valley to Scotts Flat, or
    b. Running the water gravity flow down Bear River to Ben Taylor Crossing and pumping a reliable failsafe supply back up to Loma Rica
3. Has NID done a system wide fire vulnerability assessment? What is the plan to armor vulnerable facilities/infrastructure?
4. Visualizing a community with growth rates dictated by unattainable fire insurance, and planning for demand steadily declining over the next number of decades.
5. Anticipating that demand will reduce as the entire community moves to firesafe xeriscaping around homes and businesses.
6. OR, if we don't all move to a fire safe community paradigm NOW, anticipate rebuilding after devastating fire---- think Paradise, where PVC water supply pipes melted underground.

Questions compiled from Ag Water Management Plan comments March 16, 2021 and Urban Water Management Plan comments July 2, 2021

On each submittal, none of the questions were answered at the time in public meetings, or after online or in writing. On both occasions, management promised that these questions would be answered in the Plan for Water. To date, the questions have not been addressed. At the previous Plan for water meeting when I distributed the full copy of my AWMP and UWMP comments, I was asked to compile the questions and resubmit.

From AWMP:
NID does not have a customer profile for raw water customers. Fundamentally, a customer profile can be made from the survey, and compared to OpenET data, and validated if necessary by a customer audit field verification. Lack of customer profile was noted as a fatal flaw. Questions:
Will NID be making a customer profile of raw water customers?
Will NID be using further criteria to distinguish genuine agricultural beneficial use from landscaping, hobby uses, other non-agricultural water uses?
Will NID use its customer profile to provide categorical uses in order to show beneficial uses?
Will NID prioritize agriculture over non-agricultural uses, for example, in drought water delivery reduction programs?

NID does not measure water deliveries at the farmgate. The miner's inch orifice caps usage "not to exceed contract". Thus, NID does not know how much water is being delivered to the customer. Now, a parcel by parcel analysis by OpenET provides a guideline for estimated demand.
Does NID plan to move to accurate farmgate volume measurement of water delivery to the customer?

How will NID use the OpenET data to know what the need/demand is versus what is actually delivered?

How does NID's survey compare to OpenET's parcel analysis?
With regard to the NID survey, here are questions from AWMP comments:

Irrigated pasture is the largest category, almost ⅔ of the acreage surveyed.
What is this water used for? Is it pasture for cattle or sheep?

- Is it a fish pond? Is it 4H projects?
- Is it used for horses, which are not an agricultural use?
- Is it used for hobby farming, or pet animals?
- Is it fire protection? Is it simply used as a catch all category for a landowner that simply wants to "green it up" with landscaping?
- Is it extended yard space?
- Is it water features?
- Is it ornamentals? or a swimming pool?
- Is it wasted water, or aesthetic creek maintenance?
- Or is it just bad data and misreporting?

This also raises the question of what is NID's definition of agriculture; presumably, agriculture would have some criteria using commerce as a measure. For example,

- what gross receipts from agricultural sales is the threshold for commercial agricultural water use?
- What is defined as small scale or hobby farming?
- Does filing a schedule F tax return serve as a legitimate criteria?

Raw water deliveries grew by over 5% from 2016 through 2020, and over 80% of that growth are listed as either irrigated pasture or family orchard/garden.

- What is that growth actually?
- Is it farming?
- Is it suburban rural lifestyle use?
- How would you characterize the beneficial use categories?
- What volume is in each category?

In AWMP table 7-2 referring to "On-Farm Irrigation Capital Improvements", NID states: "It is not locally cost effective for the District to finance capital improvements to agricultural customers because due to the District's water rights and supply infrastructure fixed costs, there are no incremental cost savings from potential local on-farm capital improvements." Does this mean NID believes that assisting customers with conservation measures is an "on farm irrigation improvement" and thus by definition is "not locally cost effective"? That would mean customer assistance for raw water conservation is a non-starter for NID? Is that true?

UWMP compiled questions:
In table 3-4, the total raw water "customer duty" is stated as about 140,000 acre-feet. From the AWMP, NID states the total number of irrigated acres is about 32,000 acres. Dividing one by the other shows the per acre use is about 4 ⅓ AF/acre. State of California guidelines state that application should not exceed 2 ½ AF/acre. *Are these figures accurate? How does this compare to OpenET's analysis?*

Section 3.1.4, NID states that "actual raw water customer usage is difficult to quantify on an individual basis as customers order a maximum volume of water, but the actual amount diverted is based on customer practices." The only thing NID knows about customer practices is gleaned from the self-reported customer questionnaire (refer to comments on the lack of veracity of this methodology, as previously submitted in my AWMP comments).

Section 3.1.4 goes on to say that "raw water system loss, including carriage water, seepage, evaporation, stockwater, theft, and other unknown uses, is therefore included in the total raw water retail customer duty." Combined with the admission that NID knows almost nothing about how raw water customers are using their water or even how much they divert, one can only conclude that NID has little idea what is happening to the raw water below the gross aggregate volume measurements.
Does NID still stand by these assessments? If so, how does NID plan to accurately measure "customer use, raw water system loss from carriage water, seepage, evaporation, stockwater, theft, or other unknown uses"? How can NID demonstrate that it is using water beneficially if it cannot measure these elements of use? Further questions noted on this issue were:

- How much are customers actually diverting?
- How much are customers over buying?
- How many acres of what crops actually are being irrigated?
- Is water running off the customer's property?
- Is the customer over watering?
- What is the conservation potential for crops if efficient irrigation systems were used?
- How much would that cost? Would NID subsidize or incentivise efficiency?
- How much turf is being irrigated?
- What would a turf replacement program save? What would it cost?
- What would a xeriscaping program yield in saved water? At what cost?
- What does NID know about pond management?
- Which canals are seeping water how fast? (can't know that if you don't know accurately what the customers are diverting.)
- Could the worst leaking canals be lined or piped?
- What would each customer be willing to agree to if you have a menu of options? And a suite of options for subsidizing efficiency methodologies? (Can't know that if you don't audit them and have the conversation.)
- What customers could implement a pressurized system of delivery, and would they be willing to buy water by volume rather than by miner's inch contract for gravity flow?
- How much theft is going on?
- How could NID reduce evaporation?
- What in the world is "other unknown uses"?

NID needs to plan and implement strategies that are based in truth and knowledge, not vague guesses. A whole new set of value propositions needs to be developed for your customers:

- what is the value exchange for the customer taking sincere interest in smart water use that benefits the whole community?
- What assurances can NID offer to those willing to take leadership?
- What trust can be developed between the customer and NID, so customers are willing to make a real value exchange instead of over buying to protect themselves from some random NID conservation mandate of 20 or 35 or 50% across the board in response to shortage and dought?

At the front of the line should be the commercial agricultural customer who files the IRS Schedule F.

- What are their real needs?
- How can NID assure the real farmers that their needs will get met, and they won't get smacked with an across the board conservation mandate?
- What programs are in place to help farmers be efficient?
- What value propositions is NID prepared to offer?

Simply by reading the comments to the Centennial Dam NOI and NOP exercises, and the water rights protests to the Centennial dam filing with the SWRCB, NID must realize that many of these stakeholders are faulting NID on very fundamental issues. Namely,

- does NID use its water beneficially?
- How can NID document that?

- Or can it be documented that NID actually doesn't know if the water is being used beneficially or not, because NID doesn't measure volume or assess/audit uses or waste or….?
- Is NID willfully violating DWR guidelines and standards for measurement and beneficial water use and conservation?
- Does NID believe it will fare well before the SWRCB in its water rights application if it cannot make a better showing than it has done in these "compliance exercises" of the AWMP or the UWMP that we have seen this year?

NID has a new opportunity to learn about its customers and trends. NID now has a parcel by parcel OpenET analysis done in 2023. I refer to the study cited in my AWMP comments done in 2014 using Object Based image analysis (OBIA) to study NID's jurisdictional boundary within Nevada County. This data was field verified. By comparing your current study with this 2014 study, you will learn more about trends and changes. From my AWMP comments.

I refer NID to a study reported in the journal ***Science of the Total Environment*** entitled *Implications of changing spatial dynamics of irrigated pasture, California's third largest agricultural water use* by Shapero, et al.

The purpose of the study was to demonstrate the efficacy of using remote sensing and object-based image analysis (OBIA) to determine extent and trends in irrigated land use and land cover, and irrigated pasture in specific. The study methodology used as its case study Nevada County and specifically the land area clipped to the boundary of Nevada Irrigation District. Here is a quote from the study's abstract:

"Due to its significant contribution to agricultural water use worldwide, we develop a methodology to remotely sense irrigated pasture using a California case study. Irrigated pasture is the third largest agricultural water use in California, yet its economic returns are low. As pressures mount for the agricultural sector to be more water efficient and for water to be directed towards its most economically valuable uses, there will likely be a reduction in irrigated pasture acreage. A first step in understanding the importance of irrigated pasture in California is establishing a methodology to quantify baseline information about its area, location, and current rate of loss. This study used a novel object-based image analysis and supervised classification on publicly-available, high resolution, remote sensing National Agriculture Imaging Program (NAIP) imagery to develop a highly accurate map of irrigated pasture in a rural county in California's Sierra foothills. Irrigated pasture was found to have decreased by 19% during the ten-year period, 2005–2014, from 4,273 to 3,470 acres."

This comparison, based on customer profiles, could offer insight into the rates of change and the kinds of change experienced in the past decade.

Finally, from the July UWMP comments:

NID has such great potential but seems to be constrained by its insular culture. The work of developing a Plan for Water from a new paradigm that leapfrogs NID's current perspective of a century old agriculturally based irrigation water provider will be central to a successful future for our community. Neighboring water agencies have made much of that leap into the future, and I sincerely wish NID well on this journey.