

NITROGEN APPLICATION & GROUNDWATER QUALITY IMPROVEMENT

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MEASURING NITROGEN APPLICATION

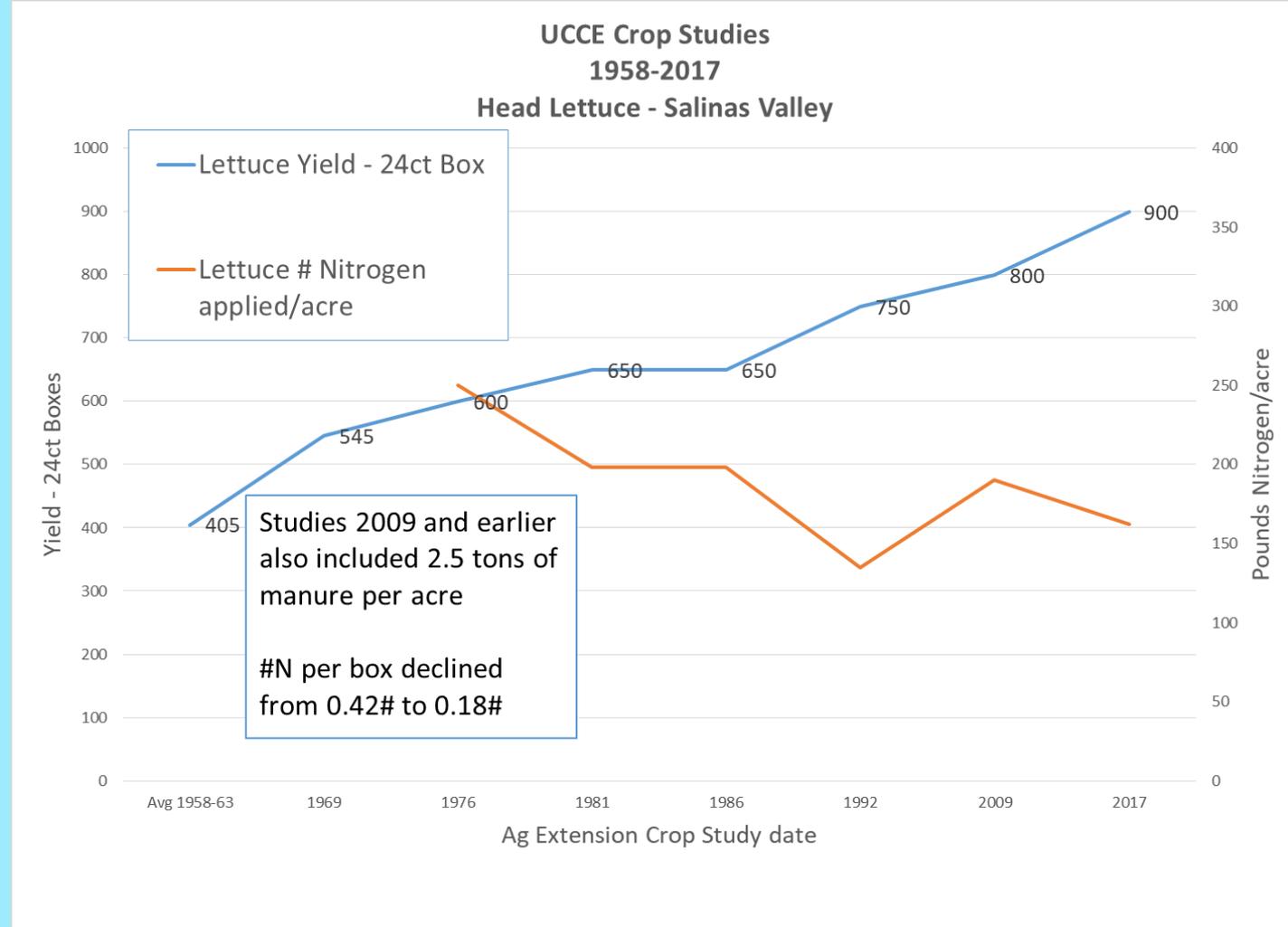
The Nitrate Expert panel report recommended measuring nitrate applications compared to nitrate removal at harvest as a proxy for potential loading of N to groundwater.

To use a proxy for regulatory purposes requires information and research to establish:

- Nitrogen application rates by ranch
 - The existing Total Nitrogen Applied (TNA) report provides this information
- Removal Coefficients for all crops
 - Presently available for a handful of Central Coast crops
- Determination of crop nitrate requirements
 - Crop N uptake for each crop
- Potential for N loading to groundwater
 - De-nitrification
 - Hydrology and Geology
 - Tile Drains
 - Organic Compost mineralization

Growers have doubled and tripled the yield per pound of N applied.

UCCE Crop Studies show significant progress with some growers harvesting 50% more than the crop studies.

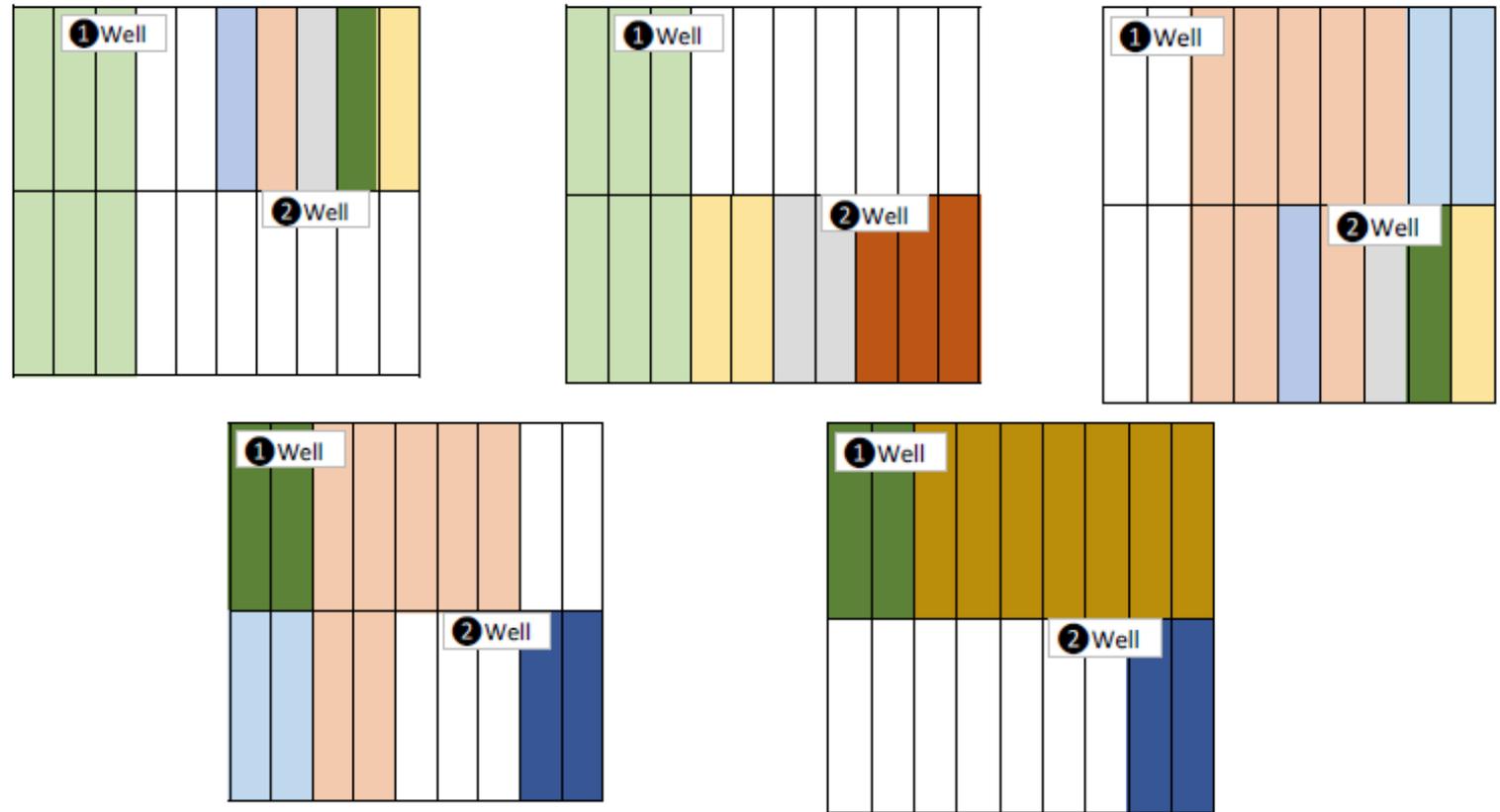


Individual ranches growing a mixture of vegetables may have over 2.5 crops per block during the year.

Nitrogen use and removal rates should be measured by ranch per year, not by crop.

Potential loading is from the ranch not when or where individual crops are planted.

Ranch crop planting sequence



PRIORITIZATION OF OUTLIERS AND ENFORCEMENT

Determination of outliers,

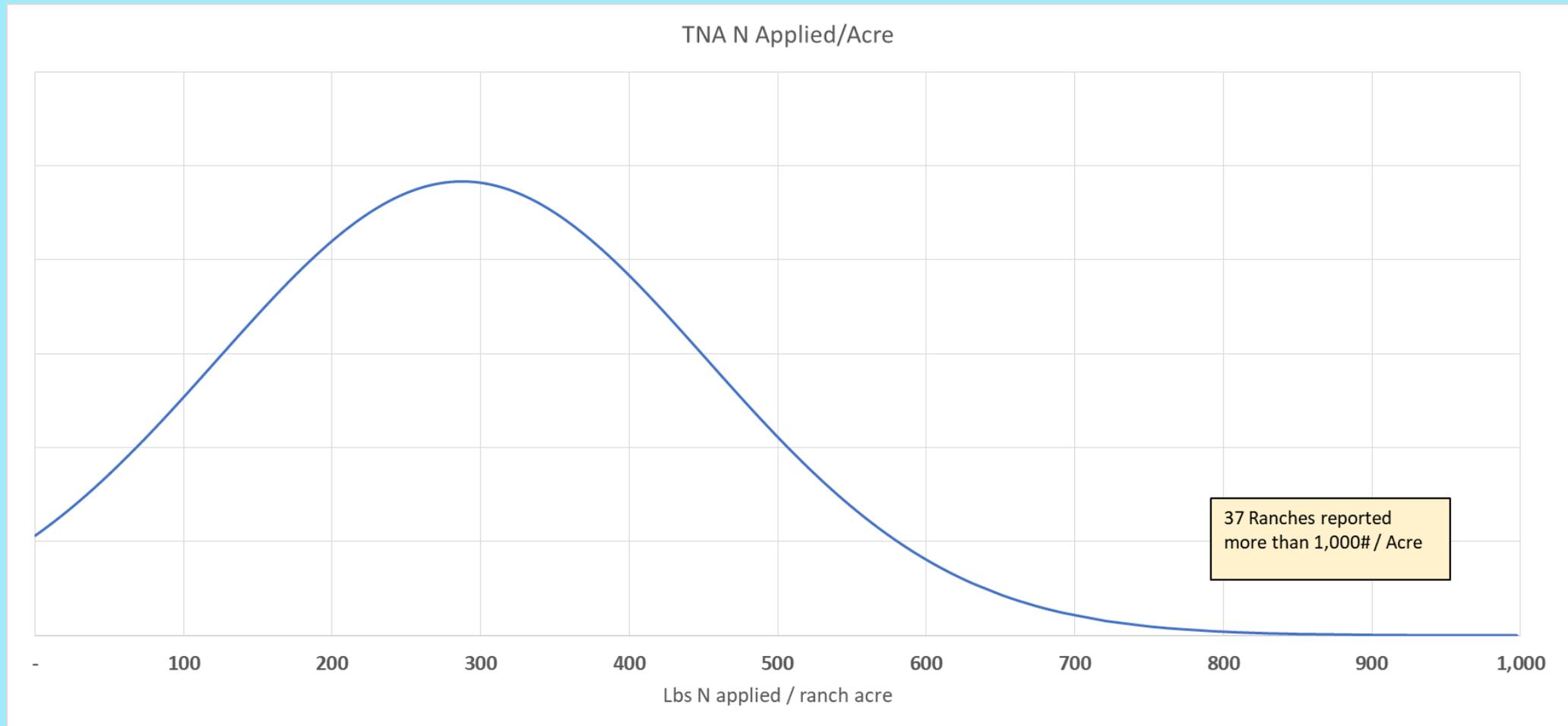
i.e. ranches with application rates greater than the 90th or 95th percentile.

- Focus education on these individual ranches with possible management practice adoption and greater reporting requirements.
- Enforcement by RWQCB if ranches do not comply with education, reporting and practice objectives.
 - This provides the greatest incentive for all growers to be frugal with N usage.
- All other farms would file annual TNA reports and complete a summary Irrigation and Nutrient Management Report.

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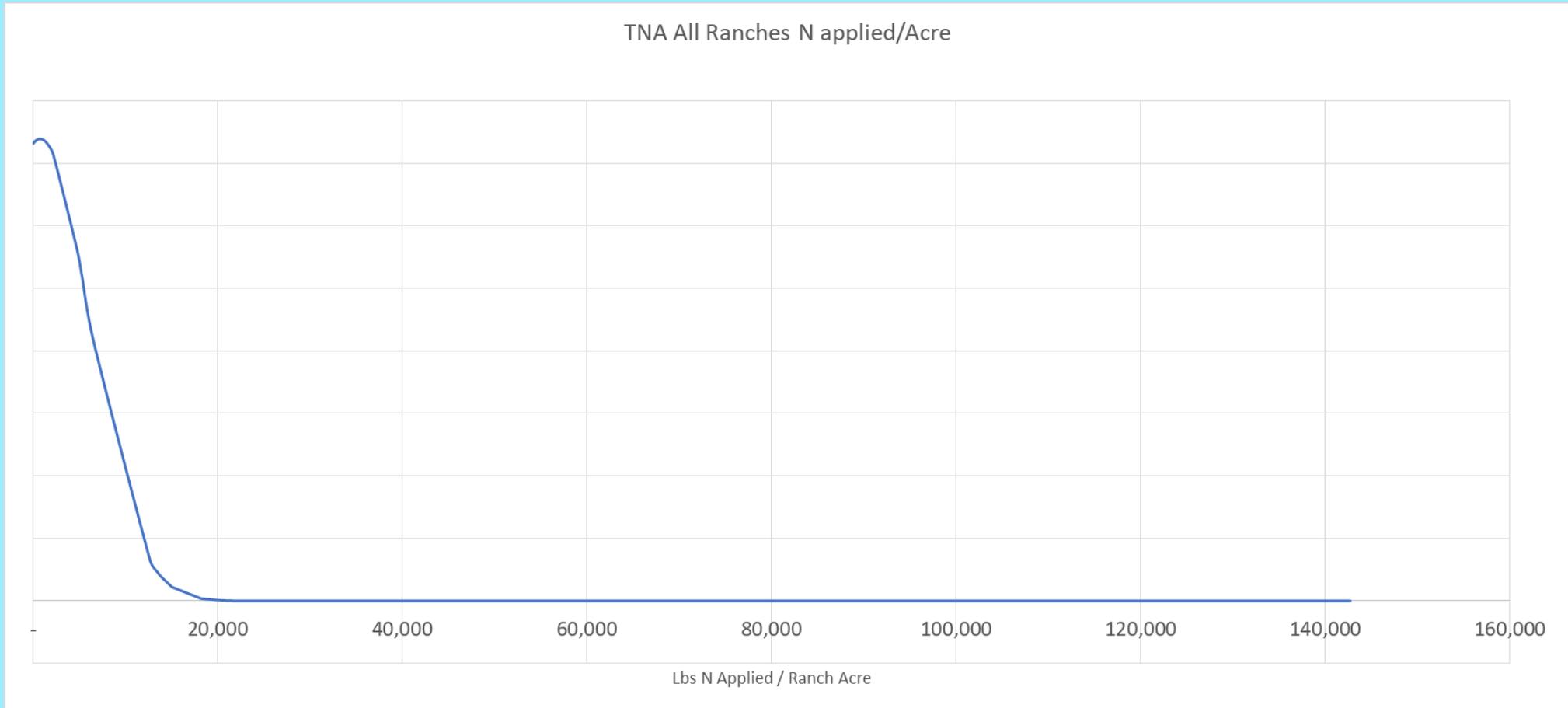
The 2017 TNA report for 1550 ranches



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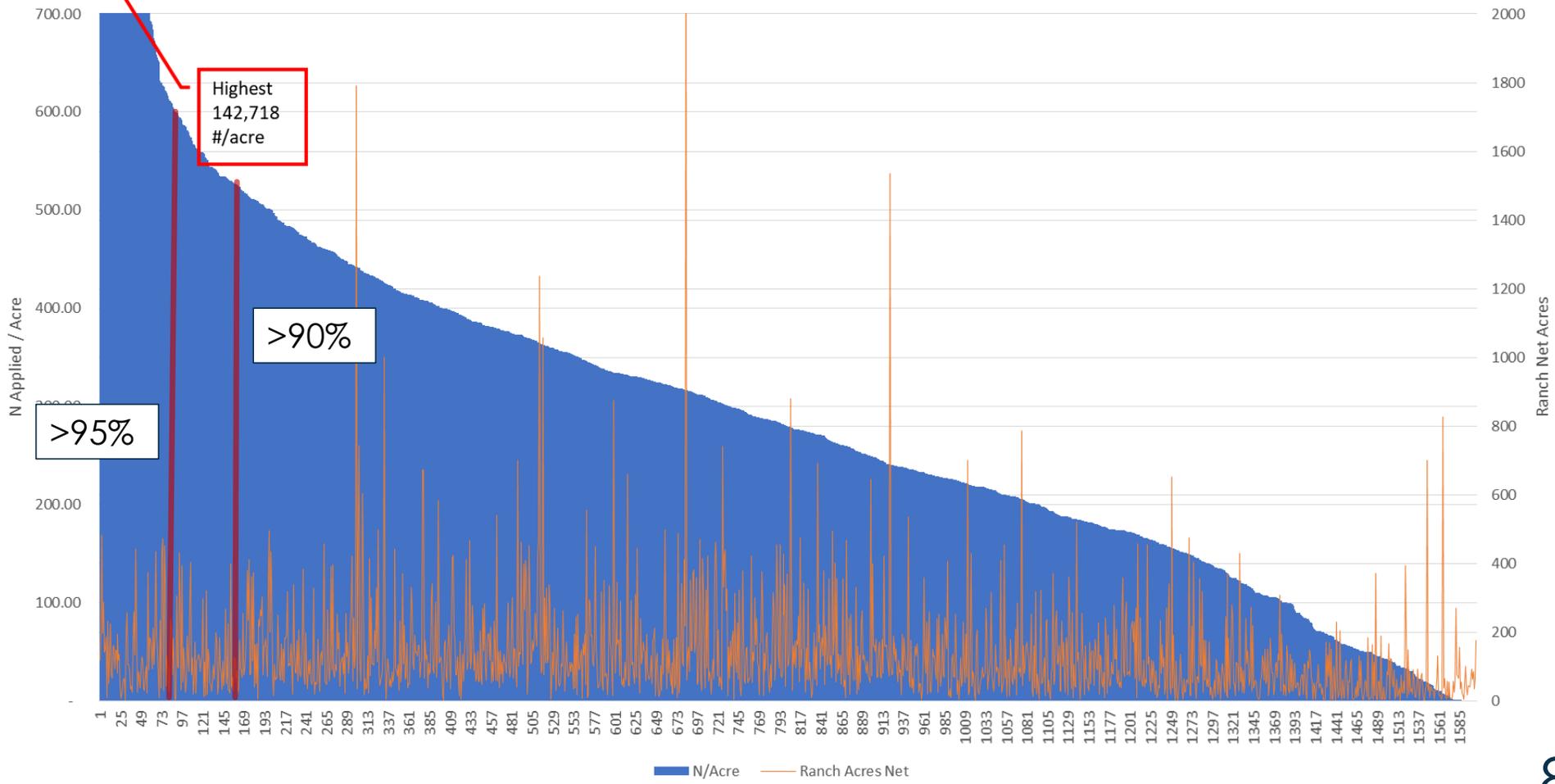
The 2017 TNA report for all 1587 ranches



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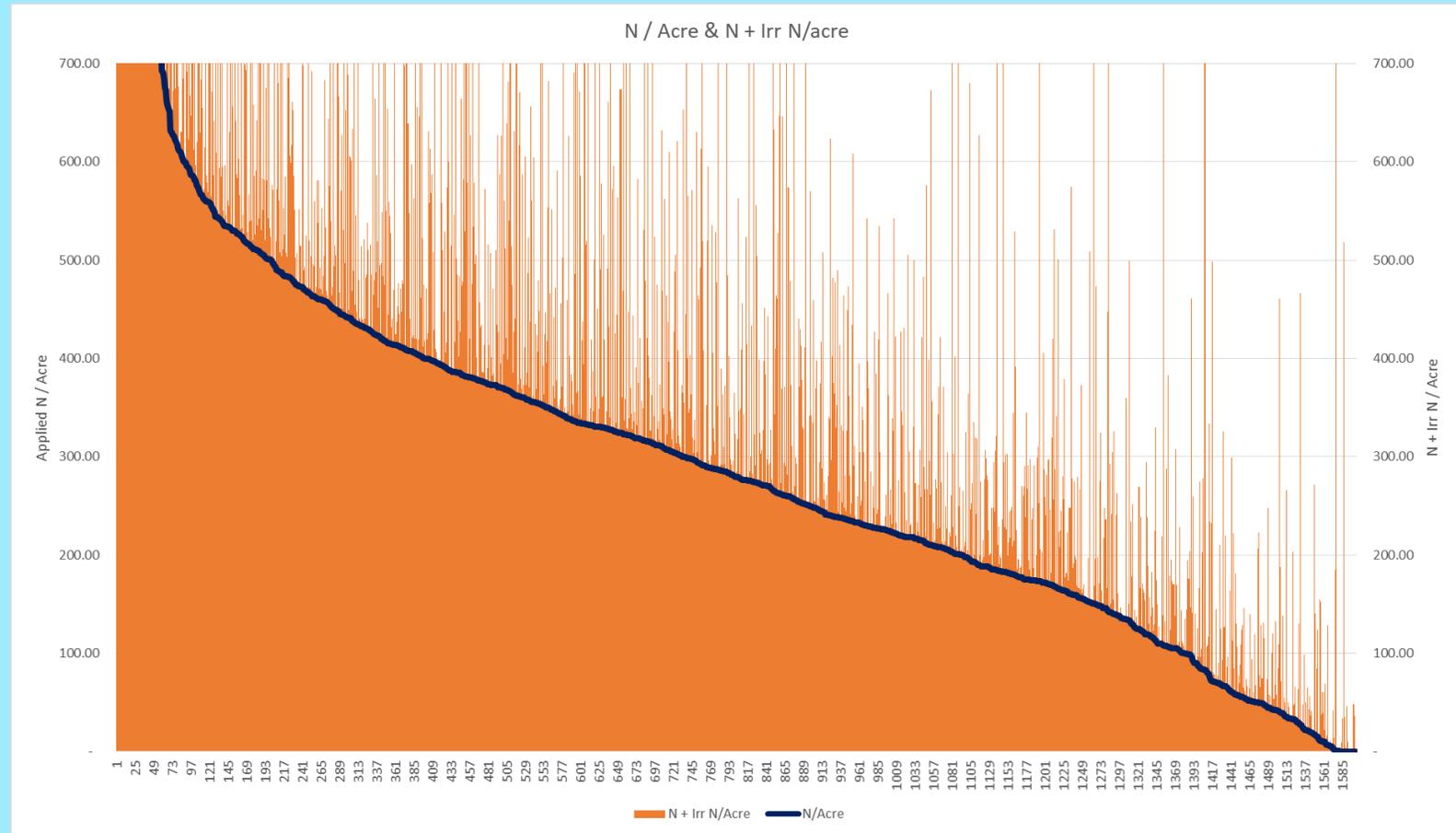
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N / Acre & Ranch size
All 2017 TNA data



Tracking N applied will incentivize **Pump and Irrigate**, reducing N applications.

Not all irrigation water is available for plant uptake due to field preparation and germination.



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Crop N Requirements

Each crop requires a minimum N uptake to produce a marketable harvest

	Crop N uptake (lb/acre)		N removal with harvest (lb/acre)		Average N Uptake	Average N Removed	Uptake/Removed (U/R)	Uptake - Removed (U-R)	Est. N Applied U+30%	A/R	A-R
	Min	Max	Min	Max							
Baby lettuce	70		46	46	70	46	1.52	24	91	1.98	45
Broccoli	180	343	60	110	261.5	85	3.08	176.5	340	4.00	255
Brussel Sprouts		490		154	490	154	3.18	336	637	4.14	483
Cauliflower	180	285	60	71	232.5	65.5	3.55	167	302	4.61	237
Lettuce (80", 6 line) Iceberg or head	165	178	50	80	171.5	65	2.64	106.5	223	3.43	158
Lettuce Romaine, all others, and leaves	120	150	50	80	135	65	2.08	70	176	2.70	111
Onions	120	160	93	120	140	106.5	1.31	33.5	182	1.71	76
Spinach (Baby)	74	85	48	55	79.5	51.5	1.54	28	103	2.01	52
Spinach (Bunch)	120	130	72	78	125	75	1.67	50	163	2.17	88
Strawberry	200	240	92	100	220	96	2.29	124	286	2.98	190
Lettuce + Broccoli					433	150	2.89	283	563	3.75	413
Romain + Baby Lettuce + Cauliflower					437.5	176.5	2.48	261	569	3.22	392

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Crop	CROP "N" DEMAND			
	A - Typical N Crop Uptake Ranges (lbs./acre)		B - Harvest N Removed (lbs./acre)	
Broccoli	180	337	60	99
Cabbage	180	285		180
Cauliflower	180	355	60	70
Celery	200	250	120	160
Lettuce	120	150	50	80
Baby lettuce	70		46	
Spinach (Bunch)	120	130	78	85
Spinach (Baby)	74	85	48	55
Spinach (Tennage)	94	100	61	65
Strawberry	200	260	92	100
Blueberry	275	300	19	38
Bell Pepper	200	260	80	110
Mizuna (rep salad mix vegetable)	99		58	
Cilantro	104	200	57	
Tomato	240	300	120	160

Strawberry Commission Meeting, August 8, 2017
Chris Rose and Peter Meertens, CCRWQCB

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RESEARCH AND COMMENT PRIOR TO DRAFT ORDER AND CEQA

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WDR vs Waiver

Adoption of a general WDR for agriculture allows change over time as apposed to the 5 year fixed nature of an Ag Waiver.

For example a WDR could provide:

- Use of TNA reporting until Removal Coefficients are adopted for 95% of crops by acre, estimated 5 years.
- Implementation of Crop N Removal tracking for the next 5 years until sufficient data is assembled to determine usage by township
- Schedule hearings to determine
 - N removal coefficients
 - Crop nutrient uptake requirements
 - Potential groundwater loading

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Central Coast Ranch Size

Number	%	acres	%	
4,095		413,181		Total
431	10.5%	1,396	0.3%	5 acres or less
781	19.1%	4,253	1.0%	10 acres or less
1,449	35.4%	16,032	3.9%	25 acres or less
2,157	52.7%	42,371	10.3%	50 acres or less
1,916	46.8%	335,925	81.3%	>50 to <1000
22	0.5%	34,885	8.4%	over 1,000 acres