CDFA AND NITROGEN FERTILIZER MANAGEMENT

California State Water Quality Control Board
CalEPA

5/4/2016

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Science Advisor to the Secretary

PRESENTATION OUTLINE

1. CDFA's role in nitrogen fertilizer management

2. Investments in nitrogen management
   - Research
   - Outreach and Education
   - MOU

3. Nitrogen Tracking and Reporting Taskforce

1. CDFA's role in nitrogen fertilizer management

- Authority on fertilizer distribution, licensing and registration including nitrogen fertilizers
- Has agronomic experience coupled with scientific expertise
- Works to build collaborative partnerships with state agencies and stakeholders
- Seeks practical, yet effective, solutions to address agricultural issues including environmental issues
- Works to support agricultural sustainability and food security in California

1. CDFA's role in nitrogen fertilizer management

- CDFA's Fertilizer Program
  - Responsible for licensing fertilizer manufactures and distributors
  - Responsible for registration of fertilizing material product labels with nutrient guarantees including nitrogen
  - Collects tonnage data on fertilizer

distribution throughout the state

https://www.cdfa.ca.gov/is/ffldrs/fertilizer.html

- CDFA's Fertilizer Research and Education Program
  - Provides research funds
  - Provides outreach and education activities

https://www.cdfa.ca.gov/is/ffldrs/frep/index.html

1. CDFA's role in nitrogen fertilizer management

- The CDFA Fertilizer Research and Education Program (FREP) funds and facilitates research and education to advance the environmentally safe and agronomically sound use and handling of fertilizing materials.

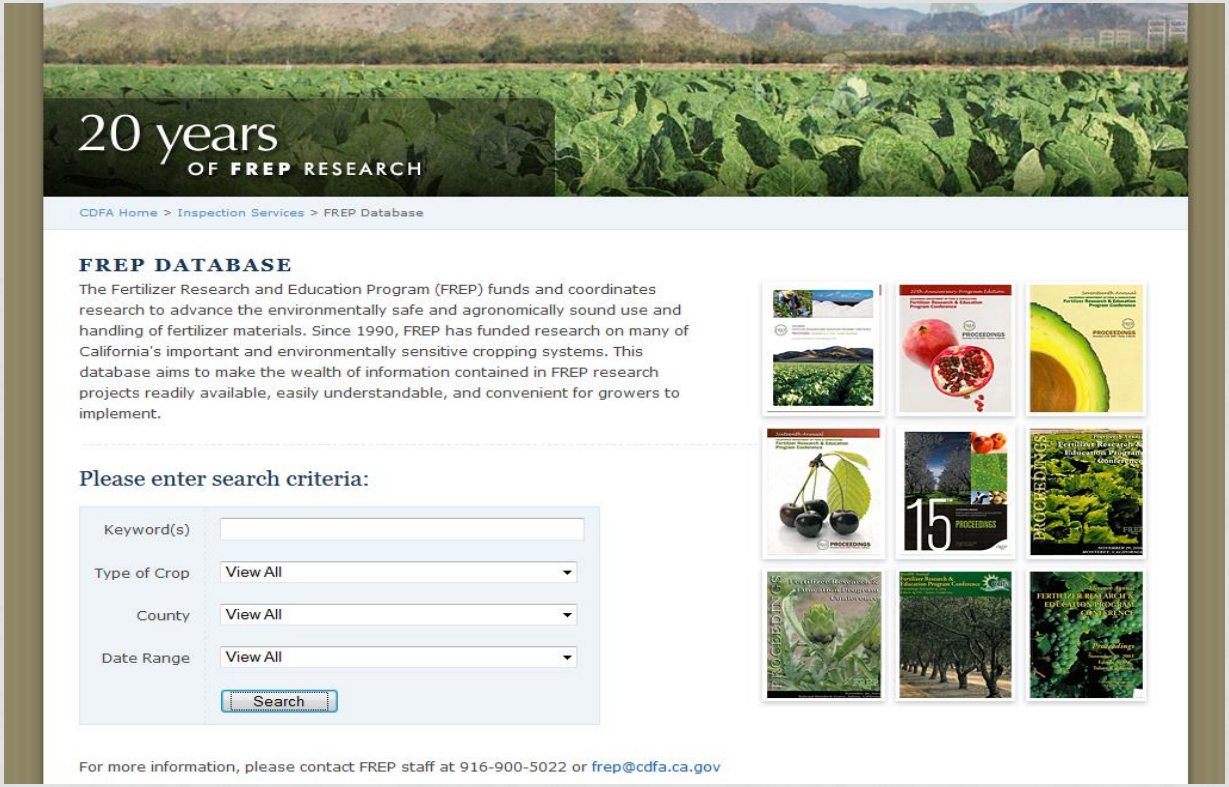
- FREP was created in1990 as a result of nitrates in groundwater

- Refocused over last four years to focus on water quality protection

- FREP serves;
  - growers
  - agricultural supply and service professionals
  - extension personnel
  - public state agencies
  - consultants (e.g., Certified Crop Advisors)

2. Investments in nitrogen management

- Research



Agronomic and Scientific Knowledge gaps

There is a considerable need to improve our understanding of nutrient dynamics in soils and crops. California grows more than 400 crops, and has significant soil and climate variability across the state.

2. Investments in nitrogen management

- Research

Adoption of Best Management Practices

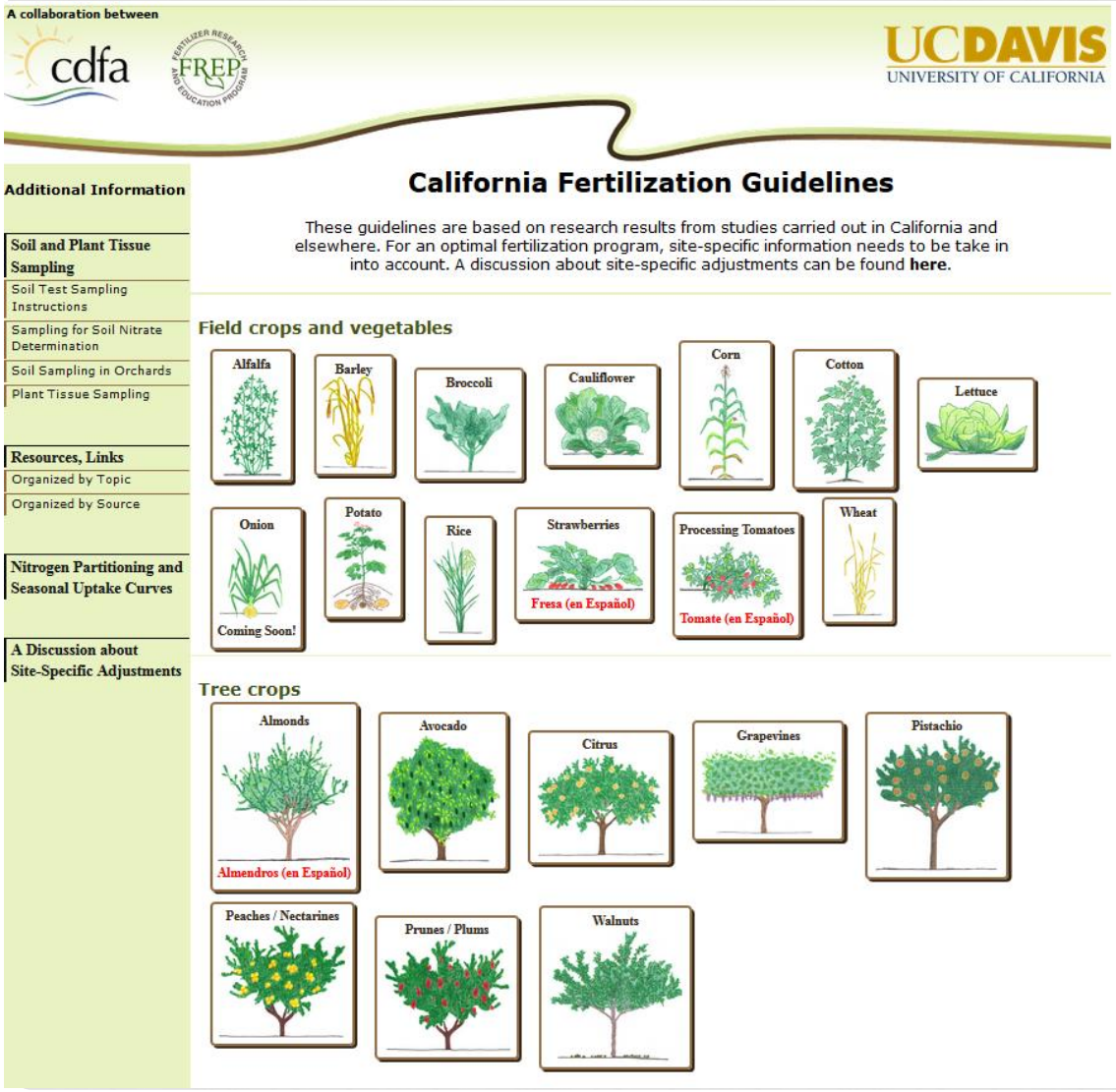
California growers are among the most sophisticated in the world. However, due to the high farming intensity, the industry must be as efficient as possible to protect the resources on which we depend. Growers must have access to the best nutrient management information to support their decision making on-farm.

"Pump & Fertilize" research project:
Determining the Fertilizer Value of Nitrogen in Irrigation Water

- Accounting for nitrogen in irrigation water can reduce fertilizer needs
- Even very low concentration of nitrate in irrigation water was taken up by vegetables
- Now in nitrogen management plan of the ILRP of CVWQCB

Development of user-friendly tools

Searchable database, crop fertilization guidelines, and decision-making tools for the farming community



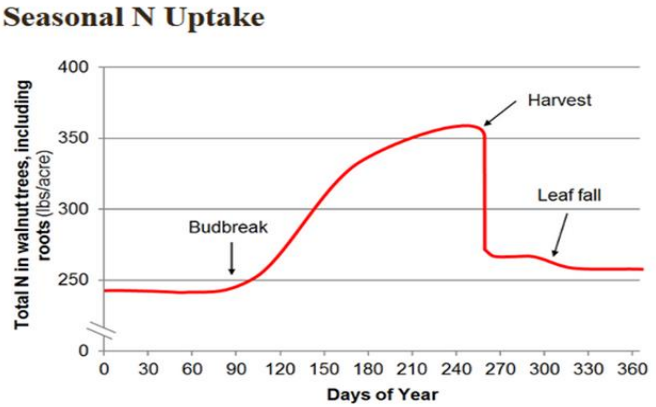
Crops in the CDFA/FREP Fertilization Guidelines, their California acreage and approximate N usage			
Commodity	**Harvested Acres †**	**Average N Rate* (lbs/ac)**	**Approximate Relative N use (lbs)**
ALFALFA	960,000	5	4,800,000
ALMONDS	840,000	179	150,267,600
BARLEY	42,000	134	5,607,000
BROCCOLI	121,000	190	22,937,970
CAULIFLOWER	31,000	238	7,366,530
CITRUS	271,000	‡	26,136,400
CORN	631,000	245	154,595,000
COTTON	278,000	174	48,246,900
GRAPES	820,000		26,882,450
LETTUCE	198,500	192	38,159,640
PISTACHIOS	203,000	158	32,159,260
RICE	561,000	130	72,896,340
STRAWBERRIES	41,500	192	7,977,960
TOMATOES, PROCESSING	252,506	182	45,844,989
WALNUTS, ENGLISH	280,000	137	38,376,800
WHEAT	394,000	176	69,430,680
Total Acreage of FREP Guideline Crops	**5,924,506**		

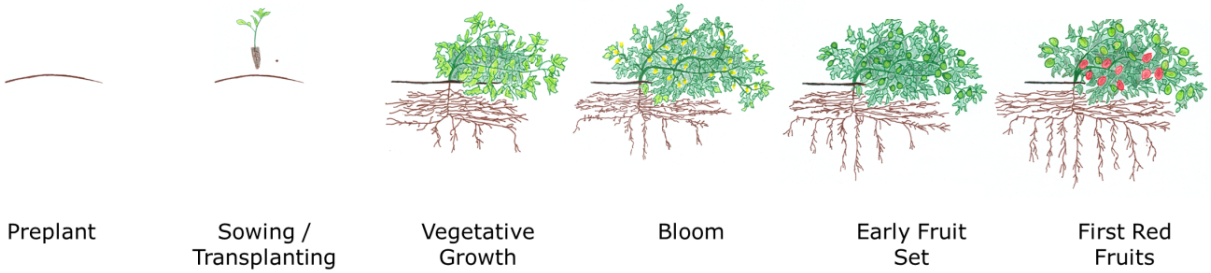
† NASS 2013

*N rate is from California Nitrogen Assessment, Chapter 3; or within range of ANR recommendations

‡Citrus rates vary

Processing tomatoes





Nitrogen (N)		**Soil Test**			**Leaf Analysis**	
	Preplant N	**Starter N**			**Soil Applied N / Foliar N**	
Phosphorus (P_2O_5)	**Soil Test**				**Leaf Analysis**	
	Pre-Plant P	**Starter P**		**Soil Applied P**	**Foliar P**	
Potassium (K_2O)	**Soil Test**				**Leaf Analysis**	
	Pre-Plant K	**Starter K**		**Soil Applied K**	**Foliar K**	

Acknowledgements

Additional Information:

- Tomato Production in California (Historic Background, Production Statistics)
- FREP Database

Links:

- University of California Cooperative Extension – Vegetable Research & Information Center
- University of California Vegetable Crops Nutrient Management

Processing Tomatoes Fertilization Guidelines

Funding provided by:

Preplant | Sowing / Transplanting | Vegetative Growth | Bloom | Early Fruit Set | First Red Fruits

Nitrogen (N)

- Soil Test
- Leaf Analysis
- Preplant N
- Starter N
- Soil Applied N / Foliar N

Phosphorus (P_2O_5)

- Soil Test
- Pre-Plant P
- Starter P

Potassium (K_2O)

- Soil Test
- Pre-Plant K
- Starter K

- Soil Applied N / Foliar N
- Application Rate
- Mode of Application
- Fertilizer Type
- Time of Application

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Processing Tomatoes Fertilization Guidelines

Funding provided by:

Nitrogen (N)

Soil Test | Leaf Analysis

Preplant N | Starter N | Soil Applied N / Foliar N

Phosphorus (P_2O_5)

Soil Test

Pre-Pl

Potassium (K_2O)

Soil T

Pre-Pl

Acknowledgements

Soil Applied N / Foliar N

Application Rate

Mode of Application

Fertilizer Type

Time of Application

For drip-irrigated processing tomatoes, Hartz and Bottoms[N4] found that a seasonal rate of approximately 175 lbs N/acre is adequate to maximize fruit yields in most soils. Contact your local farm advisor for more information.

Krusekopf and coworkers[N10] carried out a study in the Central Valley in ten furrow irrigated fields. A response to N fertilization was observed in only four fields. In the responsive fields, no significant yield increase with sidedress N application rates above 100 lbs/acre was observed. The total available N in these fields, which included the pre-sidedress nitrate-N in the top 2 feet of the profile and the sidedress N, averaged 170 lbs/acre [N10]. Based on this and other studies, the recommended seasonal N application rate for furrow irrigated tomatoes is 100-150 lbs N/acre [N8].

Additional Information:

- Tomato Production in California (Historic Background, Production Statistics)
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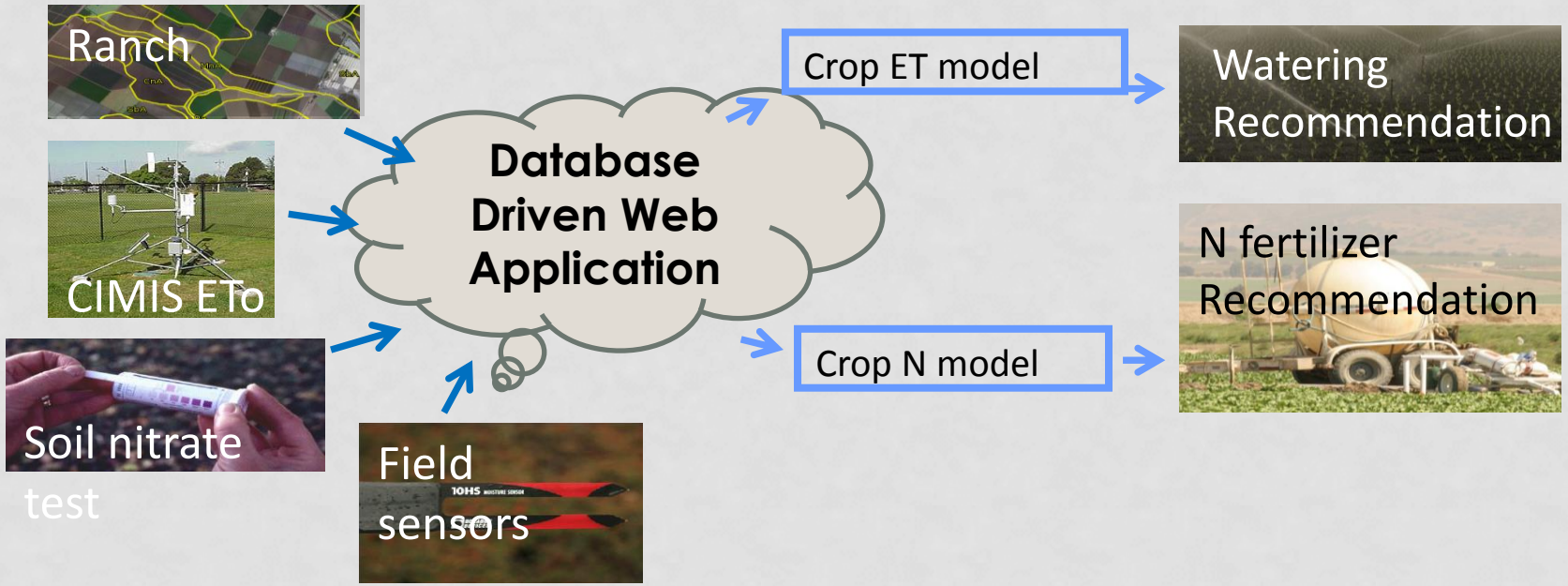
Development of user-friendly tools

- CropManage provides:
  - Weather-based irrigation scheduling
  - Nitrogen Fertilizer recommendations
  - An archive for growers (Fertilizer records, irrigation events, soil test results, irrigation water test results)
- 550 users, 250 ranches, 6700 visits



2. Investments in nitrogen management

- Outreach and Education

Technical education on nitrates in groundwater

Providing technical education and nitrogen management training for Certified Crop Advisors (CCAs) and growers self-certification through training, the FREP annual conference, and a variety of crop specific publications and brochures

Nitrogen Management Training for CCAs

- A collaboration between:
  - FREP/CDFA
  - University of California Division of Agriculture and Natural Resources (UC ANR)
  - California Association of Pest Control Advisers (CAPCA)
  - California Certified Crop Advisors (CaCCA)

1.5-day workshop focused on:

Day 1:

California's N Management Regulations
N Cycle in Agriculture
N Fertilizer Sources
Irrigation and N Management
N Budgeting
Tools and Resources

Day 2:

N Planning Practices specific to:
1. Annuals 2. Perennials

- 9 sessions across California:

  2014: 5 Sessions, 530 CCAs trained
  2015: 3 Sessions, 260 CCAs trained
  2016: 1 Sessions, 100 CCAs trained

  Total: ~890

Nitrogen Management Training for Growers

- Grower self-certification:
- Curriculum development: Condensed form of CCA training, FREP funded project with UC Davis in collaboration with FREP staff, completed September 2015
- Train-the-trainer module: FREP funded project with Coalition for Urban/Rural Environmental Stewardship (CURES), some 28 CCAs were recruited and trained in October 2015.
- Grower training sessions: Started in November 2015, in various locations across multiple coalitions areas, 30 sessions completed, ~3 scheduled through May 2016

Category	Stat
Exams graded (through 4/1/16)	1878
Grower training meetings held to date	30
Future training meetings scheduled	3
Scheduled CCA trainers	21
Total eligible CCA trainers	28
Total pass rate	82%
Average exam score	79%

2. Investments in nitrogen management

- Outreach and Education

- Supporting CCA Program
(multiple grants, multiple years)

$ 583,925

- Nitrogen Management Training for CCAs
(curriculum development and administration)

$ 384,366

- Grower Self-Certification
(curriculum development, train-the-trainers, administration)

$ 174,345

- Crop Fertilization Guidelines and Online Resources

$ 379,456

- MPEP study

$ 224,994

Total **$ 1,747,086**

2. Investments in nitrogen management

- MOU

- Signed by Secretary Ross and Executive Director Howard Oct. 2013
- Nitrogen Tracking and Reporting Task Force
- Demonstration Projects
- Technical Assistance for Decision Support Tools
- Interagency staff meetings
- Consult on regulations, policies, reports and research priorities

3. Nitrogen Tracking and Reporting Taskforce

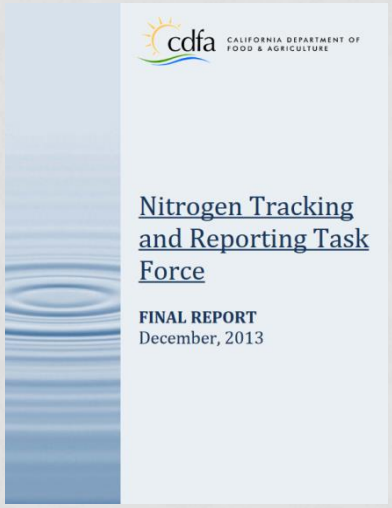
This Nitrogen Tracking and Reporting Task Force was charged with implementing Recommendation 11 of several recommendations made to the Legislature by the State Water Board:

"CDFA, in coordination with the Water Boards, should convene a Task Force to identify intended outcomes and expected benefits of a nitrogen mass balance tracking system in nitrate high-risk areas. The Task Force should identify appropriate nitrogen tracking and reporting systems, and potential alternatives, that would provide meaningful and high quality data to help better protect groundwater quality."

https://www.cdfa.ca.gov/oefi/nutrientmanagement/ntrstf_info.html

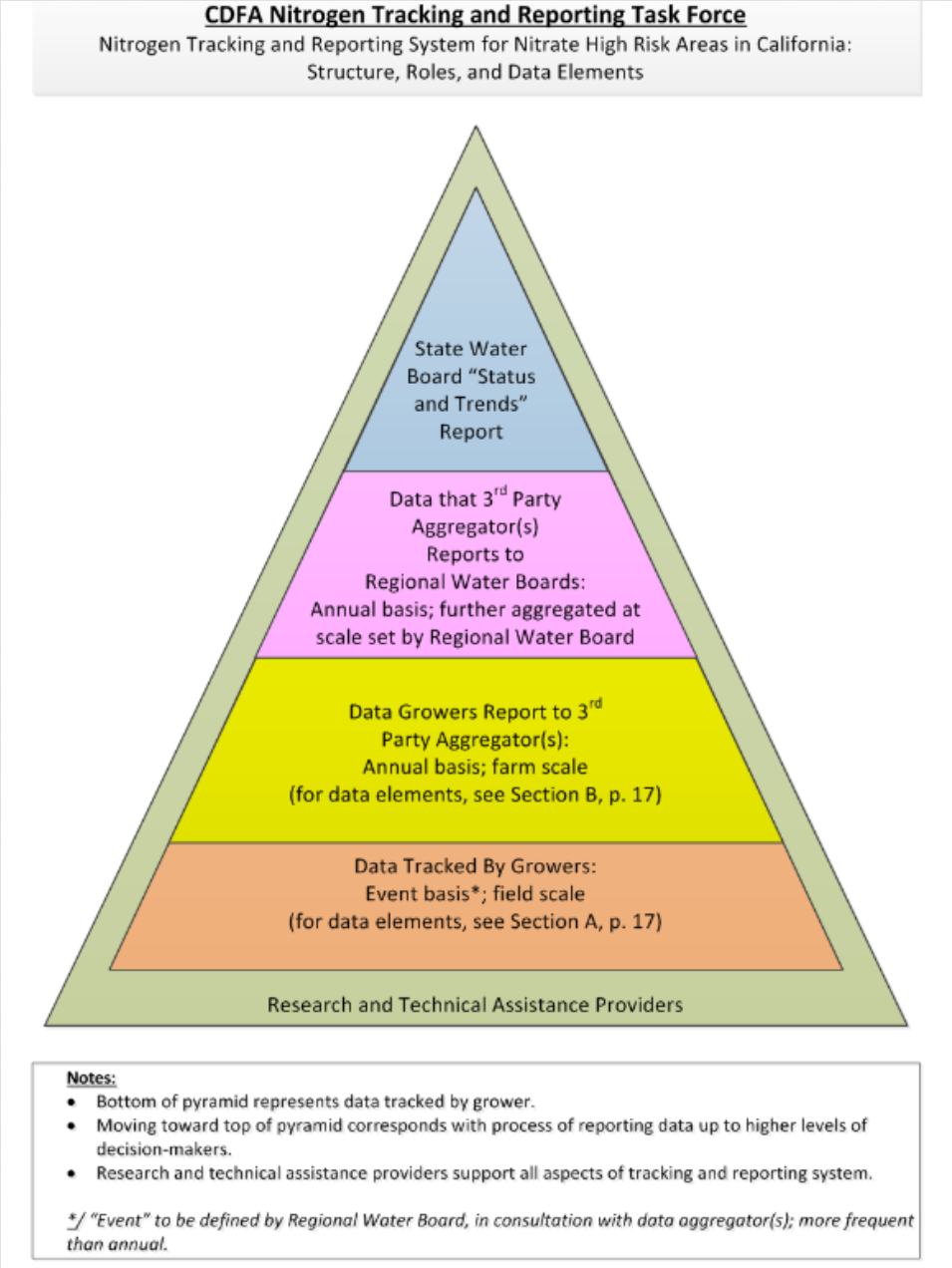
3. Nitrogen Tracking and Reporting Taskforce

1. Allan Fulton, MSc., University of California Cooperative Extension
2. Danny Merkley, California Farm Bureau Federation
3. Darrin Polhemus, State Water Resources Control Board
4. Dave Duncan, California Department of Pesticide Regulation
5. Dave Orth, Kings River Conservation District
6. David Zoldoske, EdD., California State University, Fresno
7. Deanne Meyer, PhD, University of California, Davis
8. Donna Meyers, Santa Cruz Resource Conservation District
9. Gordon Burns, California Environmental Protection Agency
10. Hank Giclas, Western Growers Association
11. Jeanette Pantoja, California Rural Legal Assistance Inc.
12. J.P. Cativiela, Dairy CARES
13. Jennifer Clary, Clean Water Action
14. Joel Kimmelshue, PhD, Land IQ
15. Karen Ross, California Department of Food and Agriculture
16. Ken Harris, Central Coast Regional Water Quality Control Board
17. Luana Kiger, MSc, Natural Resources Conservation Service
18. Marc Los Huertos, PhD, California State University, Monterey Bay
19. Pamela Creedon, Central Valley Regional Water Quality Control Board
20. Parry Klassen, East San Joaquin Water Quality Coalition
21. Phoebe Seaton, California Leadership Council for Justice and Accountability
22. Rob Mikkelsen, PhD, International Plant Nutrition Institute
23. Sandra Schubert, California Department of Food and Agriculture
24. Sonja Brodt, PhD, University of California, Davis
25. Stacey Carlsen, California County Agricultural Commissioners and Sealers Association
26. Tess Dunham, Somach Simmons and Dunn
27. Thomas Harter, PhD / Minghua Zhang PhD, University of California, Davis
28. Tim Hartz, PhD, University of California, Davis



The Nitrogen Tracking and Reporting The Task Force was comprised of 28 people representing agriculture; the environmental and environmental justice communities; local, regional and state governments; and both of California's university systems (the University of California and California State University).

3. Nitrogen Tracking and Reporting Taskforce



"Much of the tracking data are retained on farm; a subset is compiled by crop and field at the farm scale and annually reported upward to a data aggregator"

"The narrowing of the pyramid reflects increasing consolidation of information and larger geographic units of analysis as the information moves upward through the system from grower to State Water Board. Such a system is designed to effectively maintain grower confidence in the reporting system, optimize limited state resources and ensure improvement of groundwater quality"

3. Nitrogen Tracking and Reporting Taskforce

1. System Structure;
2. Data Elements;
3. Roles, Responsibilities and Data Accessibility;
4. Benefits to participate in the Nitrogen Tracking and Reporting System;
5. Verifiability;
6. Benefits of the Recommended System;
7. Limitations;
8. System Phase-in

8. **System Phase-In**: The Task Force recognizes that implementing this system represents a significant request of growers, and that it will take time for them to adjust. All implementing parties will be learning about aspects of the proposed system that works and that need adjustment. Thus, the Task Force acknowledges that development of this program will need to proceed in phases, both to allow for ongoing, supporting scientific analysis and to help growers become accustomed to the program. The results of initial efforts should be periodically reviewed to inform subsequent phases with the system's design and implementing guidance modified adaptively as needed to ensure that it is effective in improving and protecting groundwater quality. Items discussed for possible inclusion in later phases included reporting the timing and volume of irrigation and the timing of fertilizer application. The "phase-in" approach should include a timeline and milestones to ensure consistent progress toward full implementation. The pace of implementation will be driven by trend analysis, research results, and best available science. The timeline will be structured to accommodate the collection and validation of the best available science. Over time, the Task Force envisions this system as reducing methodological uncertainties, increasing the precision of results, and establishing a successful system for tracking and reporting of nitrogen to help minimize nitrate loading and maximize protection of water quality.

Thank you for the time and your attention