August 19, 2022

Karen Morrison
Acting Chief Deputy Director
California Department of Pesticide Regulation (DPR)
via email: karen.morrison@cdpr.ca.gov

Re: CPR coalition comments on the July 2022 draft of the Sustainable Pest Management Roadmap

Dear Acting Chief Deputy Director Morrison

On behalf of Californians for Pesticide Reform and Pesticide Action Network, we appreciate the opportunity to review and weigh in on the Sustainable Pest Management Work Group's draft Roadmap. We also support and appreciate the intention of the administration to create a vision and path for helping California farmers transition to more ecologically-based agricultural practices that protect human and environmental health.

We offer a number of suggestions and some significant critiques of the current draft that, if not addressed, could impede California's transition to more ecological agriculture. We summarize our greatest concerns here, and offer detailed and specific comments in the attached appendix.

1. **The state must make a clear and binding commitment to achieving the Roadmap's goals**

The Roadmap includes ambitious and laudable goals, such as reductions in pesticide-related illness and pesticide use in specified categories. However, we urge the working group to strengthen the language to establish a true commitment to achieving these goals and not a mere aspiration. Current language in the Roadmap is framed in such wishful terms as "we expect to see [the following goals achieved]" and "We believe that by implementing the Roadmap, California will be able to achieve the following goals by 2050."

The language in the North Star section, and indeed throughout the Roadmap, should be laid out in binding commitments, with a clear implementation and enforcement mechanism, and not as hopeful aspirations. The Roadmap must affirm the state's commitments and task the relevant departments and agencies with establishing the regulatory framework necessary to achieve them, with agency/department roles for each of the action items, and an unambiguous affirmation of DPR's statutory authority to direct county agricultural commissioners.

2. **The timeline for implementation should be significantly shortened, interim targets on the path to the North Star should be included, and the goals themselves should be ambitious.**

North Star goals of 2050 are too far into the future to be workable, and should be accelerated so that those currently working on achieving them are accountable for their success. In addition, the roadmap must establish far more interim targets, and measures to achieve those targets. We urge the working group to adopt the following interim targets as milestones toward attainment of the North Star goals:

a. 50% reduction of highly hazardous pesticides by 2030
b. Complete phaseout of fumigants, organophosphates and neonicotinoid pesticides by 2030
c. 50% reduction of all pesticides by 2030
d. 30% of all California acreage organically farmed by 2030
e. 50% reduction of restricted material, water contaminating and Toxic Air Contaminant pesticides by 2030
f. 75% reduction of pesticides that are restricted material, water contaminating, Toxic Air Contaminants, carcinogens, reproductive and developmental toxics, and/or endocrine disruptors by 2040
g. 90% reduction in acute and chronic pesticide-related human illnesses by 2040 (not 2050)
h. 100% elimination of all pesticides except those allowed on the National List of Allowed and Prohibited Substances under organic regulations, by 2050

3. The Roadmap should include measurable goals focused on use reduction, instead of indirect and hard-to-measure targets

While we fully support many of the health and environmental outcome-oriented North Star goals, such as 90% reduction in pesticide-related illnesses, these goals are likely to be inaccurately measured because the difficulty and fear of reporting pesticide-related illness, particularly among undocumented farmworkers, lead to consistent underreporting. Furthermore, while acute illness may be measurable (albeit underreported), the greater threat posed by pesticide use is chronic illness such as cancer, whose link to pesticides is hard to pinpoint and nearly impossible to measure. Rather than focus on these indirect goals and hoped-for outcomes, we recommend focusing solely on goals that are measurable by state institutions, including pesticide reduction targets and increased organic acreage targets.

Furthermore, the goals must have a binding commitment to data collection beginning in 2023, including regular biodiversity monitoring to assess impacts and the restoration of biodiversity from negative impacts affecting non-target animal species, including birds of prey, amphibians, fish and predatory mammals.

4. The scope and definition of SPM and IPM in the Roadmap must be revised:

A. Organic farming must be fully incorporated throughout the roadmap as an SPM strategy.

Organic agriculture is almost entirely excluded from the roadmap and not specified in the definition of "Sustainable Pest Management." We urge the working group to include organic agriculture in the SPM definition and incorporate it throughout the roadmap because it is a defined set of tools and practices, with a certification system and a clear and measurable definition that includes limiting synthetic pesticide use. As such, it is a valuable category for setting goals and tracking progress toward sustainable pest management goals. Organic farming prohibits approximately 900 synthetic pesticides, as well as synthetic fertilizers, has a long-established certification and enforcement system and is recognized in statute federally and in

California. Organic farming should be explicitly eligible for any funding, incentives, research or other support that arises in support of Sustainable Pest Management or from the Sustainable Pest Management Roadmap.

B. Biological controls must be included as an SPM strategy

The Roadmap needs to be grounded in a biodiversity framework, and should include language throughout about naturally-occurring biological controls and their importance for a healthy ecological system that *doesn't require the use of chemical pesticides*. Understanding and supporting adoption of biological control should be a primary focus of the Roadmap and of all efforts to support farmers' transition away from pesticides. Furthermore, total pest eradication should not be cited in the Roadmap as a goal. Nearly all pest eradication efforts have failed, and therefore the emphasis should be on preventing pests and, when necessary, managing pests below economic thresholds.

C. The Roadmap should adopt the UC IPM definition

The IPM definition on page 66 does not mention preventative measures, and does not mention biology or biological controls. These are invariably included in an IPM definition. The working group should adopt UC Davis' IPM definition:

> "IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment."

5. The State should provide greatest resources to small-scale, limited resource, and socially disadvantaged farmers and ranchers to address pesticides

We strongly support increased assistance to farmers to facilitate the costly transition to organic and other sustainable practices. The state must prioritize the provision of resources to those historically least able to access them, including small-scale and socially disadvantaged farmers and ranchers.

We urge the working group to encourage large-scale investment in enhancing existing organizational, research and extension infrastructure. It's critical that Resource Conservation Districts be a primary source of Technical Assistance. With 95 RCDs around the state, they already have the infrastructure in place from which to support farmers' transition toward more biological and biodiversity-based farming if properly-funded and incentivized.

Other existing incentive programs like the Healthy Soils Program should explicitly support and incentivize SPM practices.

6. The Roadmap should include timeline commitments for DPR doing evaluation of new and existing products, as well as implementing mitigations

The Roadmap should include commitments and an enforceable timeline for review and possible de-registration of existing products, prioritizing those that are restricted materials, water

contaminating and Toxic Air Contaminant pesticides. The next highest priority is timeline commitments for evaluation of new products based on 4(a) and 25(b) ingredients and biologically based products.

We do not however support expediting registration of pesticides USEPA has classified as reduced risk. DPR has commendably set a higher bar for reduced risk pesticides, and this additional review should not be compromised.

In order to end the endless practice of "whac-a-mole" where harmful pesticides are replaced by other newer but still harmful chemicals, the state must take a precautionary approach to new products, and resist the pressure from industry to fast-track registrations. We are concerned about the emphasis throughout the Roadmap for "efficiency" and "fast-tracking" in the registration process, and urge the working group to include language that affirms the necessity of thorough evaluation.

7. **The Roadmap should include a plan for protecting communities most impacted by agricultural pesticides**

The Roadmap should note that in the interim, before any reduction targets are met, the state needs to develop and implement a plan to protect communities from ongoing acute and chronic impacts of pesticide exposure. A Community Support Fund directed by the Department of Pesticide Regulation that provides direct prevention and protections from synthetic pesticide use should also be included in the Roadmap. Decisions on how the fund is spent should be left to community members most impacted by synthetic pesticide use. Examples of protections include enforceable buffer zones, indoor home air purifiers/filters, tarping of all fumigations to prevent emissions, personal protective equipment and other actions that minimize synthetic pesticide exposure for residents of California. In addition, the state should commit to conducting cancer cluster studies and other exposure programs to identify and help communities burdened with chronic health impacts.

8. **The Roadmap should recommend that financial incentives for Pest Control Advisors to recommend chemical pesticides be prohibited**

Pest Control Advisors should be prohibited from receiving commissions for selling pesticides. No matter how much training and additional certifications are added, unless this conflict of interest is addressed, this critical role in pest management advising for farmers will bias farming toward synthetic pesticide use and will undermine the use reduction goals in the Roadmap. The state must enact legislation prohibiting commissions for PCAs.

Thank you again for the opportunity to comment.

Sincerely,

Jane Sellen and Angel Garcia, Co-Directors
Californians for Pesticide Reform

Asha Sharma, California Organizing Co-Director
Pesticide Action Network

Cc: Aimee Norman, Chief, Integrated Pest Management Branch, DPR
Julie Henderson, Director, DPR
Sarah Aird, Policy Director, Californians for Pesticide Reform

Appendix 1: DETAILED COMMENT ON THE JULY 2022 ROADMAP DRAFT

APPENDIX: DETAILED COMMENT ON THE JULY 2022 ROADMAP DRAFT

Original text is black, our comments and suggested edits are red.

Definition And Approach To SPM

WHAT IS SPM?

Sustainable Pest Management (SPM) is a holistic approach that prevents and minimizes pests in a way that protects human health and is environmentally sound, socially equitable and just, and economically viable. Pests are managed by combining biological, cultural, physical (including the use of new technologies that can improve monitoring and identification of pests and their natural enemies, pest detection and precise targeting, and optimizing plant health and resistance to pests), and, only when absolutely necessary, chemical tools, in a way that minimizes economic, health, and environmental risks.

At the heart of SPM is the *prevention* of pest problems and the intent to foster natural and managed ecosystems, including farms, cities, homes, and gardens that are resilient in the face of pests in order to minimize pest impacts and lessen the need for pesticide use or other pest control actions.

The priority outcomes for SPM are reducing human and environmental risks and interference with biological control by ~~from~~ pest management activities, while also providing effective pest management solutions.[3]

FOOTNOTE #3 Human risks include exposures that lead to both acute and chronic illnesses. Environmental risks include both direct and indirect impacts to plants and animals, water, air, soil, and ecosystems, infrastructure, and other assets more generally. Interference with biological control includes reduction in the action of predators, parasites and entomopathogens on target pests by biological as well as chemical pesticides.

SPM IN AGRICULTURE

1. *Improving soil aeration and health,water management~~, quality, use efficiency, and supply, air quality~~, and biodiversity toward a biodiversity-based farming system.*
2. *Improving air and water quality and water conservation*
3. *Advancing climate change impact mitigation and adaptation*
4. *Increasing nutrient density in crops while maintaining yields*
5. *Improving land management practices*
6. *Improving farmer and farmworker working conditions*
7. *Increasing community health and well being*

SPM is not an end point, but rather an ongoing process in a spectrum of continual improvement that integrates an array of practices and products aimed at creating healthy, resilient ecosystems, farms, communities, cities, landscapes, homes, and gardens. SPM is about stepping back and looking at the interconnectedness of pest pressures, biological control, ecosystem health, and human wellbeing. SPM asks each one of us, whether working at the State, regional, commodity,

field, building, or garden scale, to become an active participant and an informed steward in the effort to co-create a healthy, thriving California.

This approach requires the inclusion of all stakeholders that are invested in and impacted by pest management in agriculture. Growers, PCAs and crop consultants, farmworkers, Indigenous land stewards, County Agriculture Commission staff, community members, researchers, advocates, policy makers, commodity groups, supply chain partners including processors, input suppliers, shippers, and distributors – everyone is needed to understand the wide range of needs, access the necessary knowledge and expertise, and scale up SPM in the field.

See adjusted IPM definition below in Appendix: Glossary section.

Focus Areas (pg. 14) need to include:

- Risk reduction for farmers, farmworkers, and agricultural communities
    - Longer restricted entry times after pesticide application to reduce farmworker exposure to residues
    - Buffer zones and additional no spray areas
- Land tenure and access to indigenous communities for traditional stewardship

North Star: pg. 15-16
2030 ~~2050~~ Goals for California Pest Management
90% reduction in pesticide residuals in offsite water, land, and air - This goal should also include: 90% reduction in exposure of farmworkers to pesticide residuals on crop plants and this needs to be added to the diagram also

A note on the 2050 Goal: "90% reduction in the use of a yet-to-be-defined group of pesticides"
While the full Work Group agrees that reducing these kinds of impacts is important, the Work Group hasn't yet agreed on the way in which to define pesticides with those impacts.

There are different ways to address this, one one-stop-shop is the PAN International's Highly Hazardous Pesticides report that is well-referenced, relies only on authoritative government resources, and is periodically updated. The following paragraph specifically lists those PAN HHP resources. https://www.pan-uk.org/site/wp-content/uploads/PAN-HHP-List-2021.pdf

Advance SPM in Both Ag and Urban Contexts
Update California's Pest Prevention and Exclusion Systems, pg.19-21

Successfully preventing pest outbreaks is the foundation of an effective sustainable pest management strategy and limiting the need for pesticides in the first place. Systematic detection, prevention, surveillance, exclusion, and proactive planning are essential to keeping pests in check. However, pest monitoring and exclusion has long been underfunded, and in addition,

funding has been significantly cut in recent years, severely diminishing critical biosecurity infrastructure…

Biodiversity monitoring requires baseline inventories and then ongoing monitoring. The amount of insect species that occur in California is unknown, and likely around 50K-200K with only 40K to 60K having been named and described by science. There are no maps or even good site-specific characterizations; we are blind. There are technical challenges in catching and even viewing insects, especially the majority that are tiny forms. Also the "taxonomic impediment" means that nobody is capable of ID'ing most of them. The few taxonomists we have work slowly using 400-year-old methods.

Goals:

1. **State efforts:** By 2025~~2030~~, California, coordinating across Federal, Tribal, State, and County programs, has strengthened its biosecurity measures to effectively prevent further proliferation ~~and eradicate~~ invasive species to protect California's agricultural industry, ecosystems, and natural and cultural resources. See above feedback letter on "eradication"

2. **Regional efforts:** By 2030, every growing region in California has a strong collaborative process in place to prioritize invasive pest prevention and enable coordinated pest detection and exclusion at a landscape scale.

3. Farm-scale efforts: By 2030 ~~2040~~, all growers understand their role in invasive species detection and reporting.

Priority Actions:

A. Strengthen pest prevention and detection

ii. Finalize the CalTrap initiative… There are a plethora of existing farmer/ag centric electronic-based support tools. No further development of novel software should be conducted without an assessment of existing online/software resources. Agriculturists are already reaching a saturation point of electronic tools for improved working land stewardship and resource monitoring. DPR and CDFA should other agency monitoring and reporting software and combine efforts rather than develop yet another program for producers to keep track of. Examples of websites/apps/software that could be utilized for this purpose include: The California Farm Demonstration Network (funded and developed in part by CDFA and USDA NRCS), OpenTeam (with support from USDA NRCS), PastureMap (with start-up support from USDA NRCS), etc.

iii. Fund investments in new technologies… Same feedback as above. Fund demonstrably successful existing technologies

iv. Support growers' engagement in biosecurity: Initiate a coordinating effort to ensure that, by 2030 ~~2040~~, all California farmers and farmworkers have received language- and culturally-appropriate information and training in state, federal, and on-farm biosecurity measures pertaining to invasive pests and diseases, including their own role in monitoring for

and preventing the introduction of invasive pests. As stated in the prior framework section, Climate change and globalization continues to expand and import pest issues on a daily basis. To reduce the economic and ecological cost of pest problems, growers must be provided information and training immediately.

v. Develop and further invest in the CA Biodiversity Institute's new DNA barcoding technology which gives us powerful tools for using environmental DNA (eDNA) to survey and monitor. The DNA Barcode Library and eDNA can be used to establish a baseline inventory, and then ongoing monitoring will be inexpensive (e.g. a few hundred dollars per site). Investments need to be made for the DNA-powered baseline inventory, and then (smaller) ongoing investments for the monitoring.

Improve California's Pesticide Registration and Continuous Evaluation pg. 22-23
Improving DPR's pesticide registration and re-evaluation process is a powerful strategy to facilitate adoption of lower risk materials and advancing system-wide shifts towards SPM. Expediting a transition to lower risk chemicals and other non-chemical alternatives, requires development, approval, and testing for efficacy, both in the lab and in the field, and then approval for use by DPR. These products must be moved through the registration process with as much efficiency as possible, while still maintaining a high standard for scientific rigor and assessment of human health and environmental risks that DPR is committed to. The review process must prioritize the registration of safe and effective alternative products, and in so doing recognize other regulatory actions to facilitate the availability of alternatives that complement these efforts.

While this means progress for new products, it also means that pesticides registered prior to DPR's implementation of these and other modern science-based review procedures may not reflect the best scientific understanding of risks, or have appropriate use instructions to address those risks. Through improvements to DPR's continuous evaluation program, DPR will establish a regular and transparent review process for evaluating these risks.

DPR needs to install a specific time-bound process for each step of pesticide registration. This should include both new, low-risk, and a re-evaluation process for pesticides already registered and in use. This should be able to be executed without additional, but with a shifting of, resources.

Goals:

1. New products: By 2025 (immediately preferred)~~2030~~, DPR's registration review process prioritizes and expedites alternatives to high- risk pesticides, reflects the goals of SPM, and provides clarity on its scientific review and decision-making process for both the registrants and the public.

2. Existing products: By 2025, DPR has developed a process for evaluating currently registered pesticides, consistent with the recommendations outlined in this Roadmap, prioritizing human health (e.g. carcinogens, endocrine disruptors, and developmental and reproductive toxicants) and environmental risks (e.g. significant impacts to water, air, flora, and fauna).

Priority Actions:

A. Support the adoption of SPM and the fast tracking of alternatives…

> ***DESIGN GUIDANCE 1:*** ***For the adoption of SPM and fast tracking of alternatives to be successful, it should:***
>
> *5. Include system-level analysis to help avoid unintended negative impacts as a precursor to determine which new active ingredients get expedited, to prevent more unfortunate substitutions*
>
> *11. Take into account resistance management in evaluation of all potential uses and formulations. This cannot be used to justify continued use of high risk pesticides. Unsafe tools don't belong in the toolbox.*

B. Streamline coordination with the US Environmental Protection Agency (US EPA) and others to increase instances of concurrent review by:…

While improving coordination, DPR's more restrictive view of reduced risk pesticides should be maintained. Illness and chronic health risks have been avoided by a more extensive review process of new fumigants (eg. AITC and dimethyl disulfide (DMDS). DMDS was registered in Florida where it has caused bystander illness outbreaks.)

D. Issue an annual report for currently registered pesticides in both urban and agricultural areas detailing:

i. Which active ingredients or products had been reviewed in that year,

ii. Whether reevaluation or other mitigation development is necessary, based on human health or environmental risks, adding deadlines for mitigation development and implementation

iii. What mitigation has been conducted pursuant to this process, and

iv. Which active ingredients or products will be reviewed in the upcoming year and the basis for that review.

Strengthen Coordinated Leadership Structures pg.24-27

One of the most entrenched dynamics undermining SPM across California is the lack of sufficient communication, coordination, and collaboration among leaders with varying interests. Conflict and breakdown in communication means that leaders are not getting a fuller understanding nor the insight needed to collaboratively move ~~the whole system~~ forward ~~collaboratively in a productive way~~. Conflict erodes trust and hinders collaboration, limiting the breadth of these leaders' understanding and ultimately amplifying a range of unintended negative ecological and health consequences that serve to further amplify conflict and breakdown.

To counteract this vicious cycle, intentional forums for collaboration and coordination across difference coupled with leadership and resourcing at both a state and regional level are needed. A consistent understanding of SPM among all relevant agency staff, and adequate staffing and

funding for DPR, CDFA, and other relevant State entities are essential for the State to effectively implement the recommendations of the Roadmap.

SPM LEADERSHIP AT THE STATE LEVEL
Goal:

1. Provide Adequate resources to advance SPM: By 2024, relevant State agencies and departments have the funding, staffing, and mission to advance the goals of SPM.
Additional funding for DPR must only be considered after an extensive review of the Department's current funding and staffing effectivity. Currently, DPR's budget is not sufficiently transparent and the majority of energy seems to be spent on the registration of pesticides rather than the advancement of Sustainable Pest Management, nor other critical program areas including community protections. Further, all relevant agencies' funding needs to be directly tied to measurable goals and timelines.

Priority Actions:
B. Enhance DPR's ability to champion SPM in both urban and agricultural contexts through its activities and programs. This must explicitly include County Agricultural Commissioners

STATE- AND REGIONAL-LEVEL COLLABORATION FOR SPM
Goal:

1. Coordinate SPM Activities: By 2024, the State of California should create or revamp multi-stakeholder bodies at the state and regional levels to ensure that activities to advance SPM in agricultural and urban contexts are well-coordinated and collaborative, to reduce unintended negative consequences, and enhance co-benefits.
A diversity of stakeholder voices is critical for equitable representation. DPR should develop any stakeholder groups to be reflective of the demographic make-up of California.

Additional Actions to Support Regional Pest Management Collaboration

A. Foster regional SPM collaboration, demonstrations, and peer-to-peer learning among agricultural producers, including farmers, farmworkers, PCAs, and others
This is critical for farmer transition to SPM and needs to be given greater priority. Much research has been done on the efficacy of peer-peer learning of agriculturalists.

i. Support annual regional SPM conferences for farmers that combine information sharing, capacity building, skill sharing, and networking. There are many existing conferences with a SPM/IPM focus that should immediately be supported and funded by DPR, CDFA. For example, CAFF Small Farms Conference.

ii. Create a CDFA-sponsored peer-to-peer farmer support network that facilitates shared knowledge and advances implementation of on-farm biosecurity measures that helps farmers connect and obtain current knowledge on biosecurity measures and practices. The CDFA-housed Biological Integrated Farming System (BIFS) program is an example of a successful State-

sponsored effort for peer-peer learning conducted via trusted NGO technical assistance providers. Additionally, CDFA, in partnership with the USDA NRCS, the University of California Cooperative Extension, and CA Farm Bureau Federation, is currently sponsoring an existing peer-peer farmer support network, the California Farm Demonstration Network (CFDN), that can be utilized for this purpose. As noted above in the *Update California's Pest Prevention and Exclusion Systems:* CalTrap Initiative feedback, CDFA and CPR need to explore existing and functional State sponsored resources before developing another analogous tool.

Advance SPM in Agricultural Contexts
Enhance Knowledge, Research, and Technical Assistance pg. 29-32

One of the key needs to accelerate a transition to SPM is building a knowledge base of alternative tools (including practices, systems, technologies, biologicals, ~~and chemistries~~(chemistries are not an alternative tool, but the standard), and biological controls) and preventative measures to effectively manage pest problems, ~~and~~ reduce pesticide-related risk, and reduce synthetic pesticide use. This includes speeding adoption of already-known alternative tools, as well as developing new ones. The SPM Work Group envisions a thoughtful, strategic, and coordinated next-generation research and support infrastructure for SPM. In this system, there is a strong coupling between researchers, growers, consultants, indigenous stewards, and farmworkers so that knowledge is applied and research can be informed by on-the-ground needs (see Appendix 7 for additional framing about knowledge systems in sustainable pest management). Research and outreach is holistic, collaborative, and based in the whole farm system. Research institutions and funders incentivize and support research on alternatives, starting with alternatives to high-risk pesticides.

Please consider substituting this introductory paragraph for the one below:

It is essential to build a knowledge base for the transition to SPM within a holistic agroecological framework for seeing the farming system as chemical input-based, biological input-based or biodiversity-based. Technical assistance (TA) programs appropriate to a farming system should be built from research as well as traditional ways of knowing (see Appendix 7) to equip farmers and consultants to effectively monitor pests and biological control, including pest life stages and pest to natural enemy ratios, in a multi-layer landscape approach for predicting populations and evaluating interventions appropriate to the farming system. TA must be tailored to help farmers at different stages of transition enhance biological control and eliminate or decrease pest problems below economic injury levels. Research and TA will prioritize how to build and monitor biodiversity, research and extend preventive cultural practices, and the speedy development and use of least ecologically disruptive pesticides as a last resort. The SPM Work Group envisions a thoughtful, coordinated next-generation research and support infrastructure involving growers, consultants, farmworkers and researchers consulting together to identify needs and strategies toward traditional, innovative and best practices, technologies, and tools.

Goals:
1. Expand research and development infrastructure: By 2030, California has revitalized and expanded the public and private institutional infrastructure, workforce, and processes that meaningfully fund and support SPM research and technology development. The research

community is prioritizing pest management options that are viable and are low-risk and low-impact, prioritizing cultural and biological controls, to humans and the environment and adding more alternatives to the suite of available tools. SPM research ~~is regularly and~~ explicitly ~~engaging and integrating~~ led by farmers, farmworkers, and other stakeholder expertise and needs from start to finish, including from traditional and indigenous knowledge sources, to support multi-directional learning. Research needs to be farmer led, rather than researchers engaging and integrating farmers. Farmers are experts in applicable knowledge and understand what could be practical on-the-ground, rather than merely theoretical solutions. Additionally, organic and SPM/IPM focused farmers and consultants must be prioritized.

2. Enhance extension and education: By 2030, every farm in California has access to free or affordable SPM education, training, and independent technical advice that is relevant to its crops, region, farm size, pest pressures, and language needs. Simultaneously, by 2030~~By 2040~~, every growing region in California has successful, trusted, transparent, knowledge-based networks focused on farmer-informed technical assistance and farmer-to- farmer learning. To achieve the first component listed (free training and technical advice), the latter (farmer informed technical assistance networks) will naturally arise. One is not able to function without the other, thus the time frame needs to be identical.

Priority Actions:

A. Reinvest in research and outreach for SPM. to secure a significant increase in SPM-trained technical advisors per farmers (includes UC Cooperative Extension, Resource Conservation Districts and other advisors) and funding (over 2021 levels) for SPM research and outreach, including human capacity for those programs, that reflect and serve the diversity of California farms and agricultural producers.

Meaningfully enhancing staffing and funding for SPM research and outreach (and the training required to skill up the workforce) to the UC, California State University (CSU), California community colleges (CCC), and other academic institutions, as well as non-profits and other organizations that advance educational efforts, is a critical foundational need to make SPM the standard in California. These efforts must prioritize biological control entomology as well as bringing viable alternatives to the most high-risk chemical pesticides to the field - including both chemistries that are low-risk to humans and the environment and a broader set of approaches that reduce or eliminate the use of ~~high-risk~~ pesticides, using cultural and technological practices and tools that support ~~(e.g., building~~ resilient agroecosystems~~., technological alternatives, etc.)~~

i. Increase UC staffing and funding for SPM training, research, and extension: Secure a tripling of the current ratio of SPM-trained farm advisors per farmers and a doubling of funding (over 2021 levels) for SPM research and outreach.

A timeline is needed for this increase of TA funding. Neither a tripling of the current SPM-trained farm advisors, nor a doubling of 2021 funding levels will be sufficient to install the substantial increase of TA providers to reach the 2030 goals stated above. A cursory inventory of UCCE advisors indicates there are fewer than 10 specialized IPM TAPs across the state. A doubling would not even cover one advisor per county. A recommendation is to do a (brief) analysis of existing staff and funding capacity to clearly understand the gap to be funded.

ii. Leverage the capacity of California Community Colleges (CCC) and California State Universities (CSU) to develop a sustainable career pipeline, applied research, and advance agricultural technology development and adoption that supports SPM…

This needs to include training programs for farmworkers who are interested in transitioning to SPM work such as pest level scouts.

iii. Increase funding that incentivizes research, outreach and technical assistance providers beyond the university systems to include governmental, quasi-governmental, nonprofit, business and other entities, to create the conditions for SPM to succeed throughout California.
Much of the research that is actually utilized by farmers was generated by institutions outside of the UC and CSU systems. Notable examples are: Community Alliance with Family Farmers, American Farmland Trust, and Resource Conservation Districts.

C. Expand research, demonstration, and outreach grantmaking: CDFA and DPR should expand and restructure existing grant programs to support collaborative and long-term research, implementation, demonstration, and outreach, including, but not limited to

i. Providing $3 million in annual funding to expand Biologically Integrated Farming Systems (BIFS) grants in order to increase stability and reach of the program.
The BIFS program is a key mechanism to achieve Goal 2. $3 million annually is not sufficient funding to develop an SPM/IPM peer-peer network that encompasses each of the 400 specialty crop types across all 58 counties of the State. Currently, the annual funding cycle has been capped at $1 million, and only serving one crop type and region at a time. A tripling of this amount would only be able to serve a marginally increased geographic area and at most a few more cropping systems. The program also needs to be extended from 3 years to 5-20 years. On-farm research and management practice adjustments can take at least 3 years to demonstrate a recognizable change, particularly when taking economics into account.

D. Launch a public-private SPM foundation to scale and coordinate investment in SPM: Create a public-private foundation funded with $1B over 5 years to invest in technologies and techniques (including, but not limited to, biological, technological, ~~chemical,~~ practice based, and Indigenous knowledge) to reduce the impact of pest management on humans and the environment.
There is already ample funding for chemical technologies. However, the other identified areas are in need of an increase of research funding.

Align Pest Control Advisors with SPM pg. 33-34

Goals:

1. PCAs champion SPM: By 2030, all PCAs have received meaningful training in, and are incentivized to promote, SPM and organic agriculture in the field. PCA advice is guided by SPM principles and practices and their recommendations are not commission-driven.

Priority Actions

A. Require all PCAs to become trained in SPM: Specifically:

i. Add an expanded category for a PCA certification and a new category for continuing education (CE) courses on "Sustainable Pest Management": Expand the type of content approved for PCA continuing education units to include all aspects of a farm's SPM system, including soil health, irrigation management, nutrient management, biological controls ~~beneficials~~, and enhancing farm biodiversity, and other content applicable to pest management.

DESIGN GUIDANCE 12: For the SPM training program to be successful, it should: [The draft has this labeled as DG 13; appears to be a mix-up.]

b. Include an expansion of disciplines in CE courses rather than simply the creation of new courses. Traditionally, courses such as soil science, plant physiology and ecology have not counted. The expanded disciplines must include courses in these disciplines to become a PCA as well as for content for CEUs to ensure field experience observing the role of biodiversity in soil and above-ground ecology that supports biological control. A process must be developed to identify SPM Mentor PCAs with whom students must spend a required one year internship before being licensed as an SPM PCA.

Additional Actions

C. Develop educational materials: Develop a document or workbooks that comprehensively cover IPM and SPM for all pests and diseases, including chemical, biological and cultural approaches. ~~The absence of~~ The analytical framework for development of learning support tools provided by Duru, et al (2015) need to include (1) knowledge bases containing scientific supports with experiential knowledge integrated and (2) model-based game approaches will allow "effects of agroecological practices on biodiversity and ecosystem services to be monitored" p 1275~~).~~ ~~one document that covers chemical, biological, and cultural approaches is a current gap in the system.~~

D. Implement and alternatives assessment: Develop guidance for PCAs to support follow-through of currently required alternatives assessments. The State could develop a baseline set of values and principles and learning-support tools that combine databases and qualitative modeling processes useful in an adaptive management perspective. ~~in a to guide, and be included in, these alternatives assessments.~~

Reduce Economic Risk for Growers Transitioning to SPM pg. 35-37

Goals:

1. By 2030, every grower in California has access to a suite of effective and feasible alternatives to all synthetic ~~high risk~~ pesticides ~~where available~~. Where not currently available, California has a research and funding infrastructure in place for the development of effective, cost-effective, and efficacious alternative pest management options.
County Ag Commissioners are already required to consider safer alternatives to restricted materials. Including a wider scope of pesticides that trigger an alternatives suggestions should be an easily implementable activity. "Safer alternatives" needs to be defined.

2. By 2030, California has implemented a system of incentives and financial risk management that integrates supply chain partners, educational institutions, private financial markets, and state and federal risk management programs to drive widespread adoption of SPM. More details on how information on these incentives and financial safety nets will be disseminated and eligibility is needed. Eligibility should include lessees and have a Adjusted Gross Income cap.

3. By 2030, 100% of lands owned and leased by the State of California implement SPM, 30% of which are organic.

4. By 2030, 30% of all CA agriculture is organic.

Priority Actions

B**. Promote SPM on public lands:** Identify opportunities to implement SPM on lands owned and leased by the State of California. This needs to include a pathway for the State to restore land access and autonomous tenure to indigenous communities for land stewardship and cultural and traditional practices.

> ***DESIGN GUIDANCE 15: In order for this opportunities assessment to be successful, it should:***
>
> *a. Consider making unused working lands invested in by CA public entities available to farmers practicing SPM, with priority for small and socially disadvantaged farmers, specifically calling in indigenous peoples.*
> *b. Explore mechanisms to engage State-owned agricultural easements to advance farmer implementation of SPM. Ensure any proposals are designed so as not to undermine farmer enrollment in easements.*
> *c. There may be good opportunities to engage UCCE or other experts to share SPM best management practices with Bureau of Land Management, US Forest Service, National Park Service, and other federally managed landscapes and State land management agencies, including importance of, and procedures for, reporting pests. Federally managed landscapes account for a vast amount of California's natural and working landscapes and are greatly impacted with pest problems, such as the shot-hole borer – a large contributor to the tree mortality crisis and subsequent devastating fires – and need to be integrated into the State's pest management plan for a comprehensive approach.*

Additional Actions

B. Support near-term grower transition to SPM by expanding and improving CDFA programs to increase access and funding for farmers, especially for socially disadvantaged farmers. This includes:

i. An annual budget increase to support the expansion of the Healthy Soils Program and explore ways the Healthy Soils Program can further support SPM (for reference, see practices supported by the Healthy Soils Program)

ii. Continue to review grant processes to make them more user-friendly, including working with the California State Auditor's office to streamline paperwork requirements for grantees, and providing language and culturally appropriate Technical Assistance.

CDFA and other State agency programs need to do an assessment of the efficacy of their programs and consider outside sources' program reviews and subsequently make pertinent adjustments. E.g. CalCAN's collection of comprehensive surveys and assessments of the HSP.

iii. CDFA should ongoingly incorporate farmers' feedback, especially that of small and socially disadvantaged farmers and farmers of color, in order to help the programs meet the needs of a diverse array of California's farmers

The current HSP program does not allow for farmer experimentation and has held undue requirements for an increase of soil organic matter and/or soil organic carbon within a short 3 year time frame, and no flexibility from the proposed scope of work, as is typically necessary when working on environmentally dynamic working lands. This is unreasonable and hinders the producers' interest and potential to explore alternative management methods that could ultimately reduce pesticide use while sequestering carbon.

E. Leverage crop insurance… Crop insurance needs to be available and accessible for specialty crop producers.

F. **Promote incentives,** such as

ii. ~~Incentives include technical assistance for growers applying for SPM grants.~~ Technical assistance providers who provide grant support need to include entomologists and biological control experts. That said, providing technical assistance to growers to apply for grants is not an incentive, but a necessary support mechanism. Under the "Enhance Knowledge, Research, and Technical Assistance" section, Goal 2: Enhance extension and education, it is implied that technical assistance will be accessible to all producers as a state-supported service rather than a motivation in and of itself for transformation.

iv. Developing and funding new equipment lending libraries. This is critical for producers to explore transitioning management practices. Equipment lending libraries need to be available in every ag county.

v. Incentives to diversify farming systems and increase biological control and pest resilience.

Activate Markets to Drive SPM pg. 38-40

Goals:

1. **Establish purchasing criteria:** By 2025, the State of California has established purchasing criteria for identifying and validating agricultural products that are grown in accordance with SPM.

This will be essential. The criteria should encompass a spectrum of SPM, including organic agriculture. The criteria should also not compete with the organic market.

Priority Actions

D. Enhance school food procurement… Currently, many K-12 schools serve students prepackaged, precooked meals due to the lack of kitchens in schools districts. The State must develop and fund school districts' kitchen infrastructure to increase their capacity to purchase whole foods.

Appendix 2: GLOSSARY OF TERMS

Augmentative biological control (or biocontrol) is the mass collecting or rearing and release of natural enemies (predators, parasites and pathogens) to control pests in a timely seasonal or inundative manner to prevent population increases, or to suppress a pest population.

Beneficial organisms in the context of SPM are predators, parasites, and pathogens contributing to biological control. The term does not typically include fish, amphibians, birds, reptiles, and mammals, but for practical purposes it can.

[Conservation] biological control (or biocontrol) is all about conserving natural enemies either by reduction/elimination of toxic pesticides or enhancing/modifying the environment to invoke/enhance/supplement natural control. It is a useful definition that includes all of the newer terms like ecological pest management, regenerative agriculture, farmscaping, biodiversity-based agriculture and so on. It groups all of these efforts as part of the basic term "biological control".

Biocontrol agents most often refers to predators and parasites released into nature for one or more of three goals: 1) for importation and colonization of a new predator, parasite or pathogen in what is called a "classical" biocontrol intervention, 2) for what is called "augmentation" to increase or speed up naturally-occurring biological control, or 3) for directly managing a pest.

Biocontrol monitoring consists of skills and tools to assess the ratio of the pest and natural enemy populations to indicate whether biological control is increasing or decreasing. Each farming and cropping system has relevant observable phenomena in the arthropod ecology that can be identified, counted, recorded, and compared with samples from other farmscapes and time scales. In some situations visual inspection, sticky traps or pheromone traps are sufficient. In other situations the sweep net is essential and sometimes a vacuum insect net is the only way to observe the presence of important natural enemies. Identification of organisms follows monitoring of the insect ecology. The required degree of precision in identification and the accuracy in counting numbers present depends on the level of consequence for cost-effective decision-making.

Biologicals are products derived from naturally occurring microorganisms, plant extracts, insects or other organic matter that may be categorized as biostimulants to enhance plant growth and productivity, biopesticides to protect plants from pests, or biofertility or plant nutrition products. [Note: "Biologicals" does not include biological control. A "biological" is an input

product. Biological control is the key characteristic of the system. Biologicals and biological control must each be defined and explained in relation to each other and in relation to chemical pesticides. Their meanings must be used consistently throughout the Roadmap.]

Biological control (or biocontrol), as an applied field for human intervention, is the study, importation, augmentation, and conservation of beneficial organisms for the regulation of population densities of other organism's abundance below the level of economic injury.

Biological control (or biocontrol), when considered from the ecological viewpoint as a phase of natural control, is the action of parasites, predators, or pathogens in maintaining another organism's population density at a lower average than would occur in their absence. It can be measured. Human manipulation is not implicit and it does not include plant selection for resistance to pests. It is the way to understand the centrality of biological control for transition from chemical input-dependent systems. When monitoring shows that biological control is working, it is generally too complex to cost-effectively measure and assess what actions were critical. The greater the biodiversity, the greater the complexity of interactions, the greater likelihood of a good ratio of natural enemy populations over pest populations (see monitoring).

Biological control entomology is the applied branch of zoological study dealing with insects and loosely including other arthropods (e.g. spiders and mites) for the purpose of controlling pests through conservation, importation, colonization and augmentation of beneficial organisms. Most pest species are insects and most insects have natural enemies, so biological control deals principally with insects.

Biological control phytopathology and entomo-pathology are branches of study dealing respectively with the interaction between pathogens and plants and between pathogens and insects.

Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. Three kinds: biochemical pesticides, microbial pesticides, and Plant-Incorporated-Protectants (PIPs). US-EPA

Classical or importation biological control is the foreign exploration, importation and colonization of natural enemies of a pest of exotic origin that lacks natural enemies to suppress their populations.

Integrated Pest Management: (From UC, as stated above) IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

Natural control is the maintenance of a more or less fluctuating population density of an organism within certain definable upper and lower limits over a period of time by the actions of

abiotic and/or biotic environmental factors. It is not the same as naturally occurring biological control. [DeBach]

Natural enemies in the context of SPM refers collectively to all of the predators, parasites, and pathogens that reduce numbers of pest insects and mites, and may include fish, amphibians, birds, reptiles, and mammals, e.g. bats and other rodents. Organisms can have key roles as predators and may also transport beneficial parasites and pathogens in biodiversity-based farming systems. UC IPM

Naturally occurring biological control is the action of parasites, predators and pathogens in maintaining another organism's population density without human intervention. Pioneering applied insect ecologist Everett J. "Deke" Dietrick includes antagonists as contributors to biological control. They are organisms that take up an ecological niche and resources and thereby exclude pests. It is separate from **Applied biological control** that involves human intervention.

APPENDIX 6: EXAMPLES OF ON-FARM SPM PRACTICES

Cultural

- ~~No till farming, minimum or reducing tillage.~~ While this practice is advantageous to retain the health of soil microbiology and reduce soil carbon emission, it is also often heavily herbicide dependent, thus not considered an SPM/IPM practice.

Physical

- Solarization. This is a non-chemical method of using solar energy to reduce site-specific pests, including weeds, bacteria, and insects.

SPM AND CHEMICAL PESTICIDES

- Insecticides

Appendix 7: A NOTE ON SCIENCE-BASED, EXPERIENTIAL, AND OTHER WAYS OF KNOWING

…The following is a list of guiding principles the SPM Work Group believes is essential when evaluating the legitimacy of knowledge, regardless of whether it is developed through Western science or experiential and observational methodologies, or a combination of both:

A. There is precision and attention to detail and accuracy in how the information is gathered

- Sampling of plant-predator-prey presence-absence or species identification and relevant life stages are adequately thorough, systematic, and documented.
- Time and space-specific landscape level population dynamics are observed that may be the source of unique challenges or opportunities on a farm.

- Traditional ways of knowing including intuition arise from observations of unique natural phenomena in the context of the whole living system.

B. ~~The experiment is replicable~~ Observations can be repeated in comparable farming systems with comparable variables in terms of biodiversity.

C. ~~There is a quality of generalizability. That is, the results can be applied broadly, as opposed to only on a single site or in a specific scenario~~ Inductive conclusions can be applied to other farming systems that have comparable measures of biodiversity.

D. ~~Results are carefully tracked and compared with each other~~ Results are carefully tracked and compared to other locations and/or from year to year.

E. There are clear, transparent standards for what is being measured and how

F. The methodology clearly identifies its limitations

G. The experiments are impartial, insofar as they are designed to be, and are carried out, free from contextual values of the researchers and practitioners.

H. Design, methodologies, and results are transparent