NATIONAL OCCUPATIONAL RESEARCH AGENDA (NORA)

3/27/08 DRAFT PRELIMINARY PUBLIC COMMENT VERSION

NATIONAL AGRICULTURE, FORESTRY, AND FISHING AGENDA

FOR OCCUPATIONAL SAFETY AND HEALTH RESEARCH AND PRACTICE IN THE U.S. AGRICULTURE, FORESTRY, AND FISHING SECTOR

Developed by the NORA Agricultural, Forestry, and Fishing Sector Council

Table of Contents

Introduction

What is the National Occupational Research Agenda?

The National Occupational Research Agenda (NORA) is a partnership program to stimulate new knowledge, innovative research, and improved workplace safety and health practices. Unveiled in 1996, NORA has become a research framework for the National Institute for Occupational Safety and Health (NIOSH) and the nation. Diverse parties collaborate to identify the most critical issues in workplace safety and health. Partners work together to develop goals and objectives for addressing the needs of the nation. The following types of information help inform the priority-setting process:

- The numbers of workers at risk for a particular injury or illness
- The seriousness of the hazard or issue
- The probability that new information and approaches will make a difference

NORA celebrated its first decade of demonstrated impact advancing bodies of knowledge and implementing effective workplace interventions at the NORA Symposium 2006. The program entered its second decade with a new sector-based structure to better move research to practice within workplaces. NORA sectors are based on the U.S. Census Bureau North American Industry Classification System (NAICS). This system groups establishments into sectors and industries based on the activities in which they are primarily engaged. There are 20 sectors in the United States NAICS which include 1,179 industries. Details about NAICS can be found at http://www.census.gov/epcd/www/naics.html.

Agriculture, Forestry, and Fishing (AgFF) is one of the 20 NAICS sectors. Activities of this sector include growing crops, raising animals, harvesting timber, and harvesting fish and other animals from farms, ranches, or the animals' natural habitats (North American Industry Classification System, United States 2002. Executive Office of the President OMB, 2002).

For manageability, NIOSH has aggregated these into eight major sector groups (listed below) and with its partners has formed eight corresponding NORA Sector Councils, which will develop and implement the national research agenda.

NORA Sector Group	NAICS Code
Agriculture, Forestry & Fishing	11
Construction	23
Healthcare & Social Assistance	62
Manufacturing	31-33
Mining	21
Services	51-56, 61, 71-72, 81 & 92
Transportation, Warehousing & Utilities	48-49 & 22
Wholesale and Retail Trade	42 & 44-45

Participation in the NORA sector councils is broad, and includes stakeholders from universities, large and small businesses, professional societies, government agencies, and worker organizations. The diversity of NORA Council members is one key to its success. A current list of the AgFF Sector Council members, partners and their affiliations is available at the NORA website (http://www.cdc.gov/niosh/nora/councils/agff/planpart.html).

The AgFF Council has drafted a set of draft goals, action steps, and performance measures that are included this document. This will be used as a guide to focus research and intervention efforts. When the Strategic Plan has been finalized, the AgFF Council will identify available funding, stakeholders, and other potential partners interested in providing research resources and expertise or who are participating in research to practice activities. Following the development of the strategic plans, implementation plans for the nation will be developed for the goals identified. The strategic plans will provide guidance to the entire occupational safety and health community for research prioritization, moving research to practice in workplaces, evaluation, and developing long-term surveillance. In addition, a Cross-Sector Research Council has been formed to identify opportunities for common research across sectors and to identify and remove obstacles to successful achievement of the research goals.

What is role of the NORA Agriculture, Forestry, and Fishing Sector Council?

The NORA AgFF Sector Council has been tasked to identify the most salient safety and health needs of this diverse sector and develop a strategic plan to address them. The AgFF Sector Council seeks to identify the most important research questions, recognize priority safety and health concerns, understand the most effective intervention strategies, and disseminate information on how to implement those strategies to achieve sustained improvements in safety and health workplace practice.

Who is the target audience?

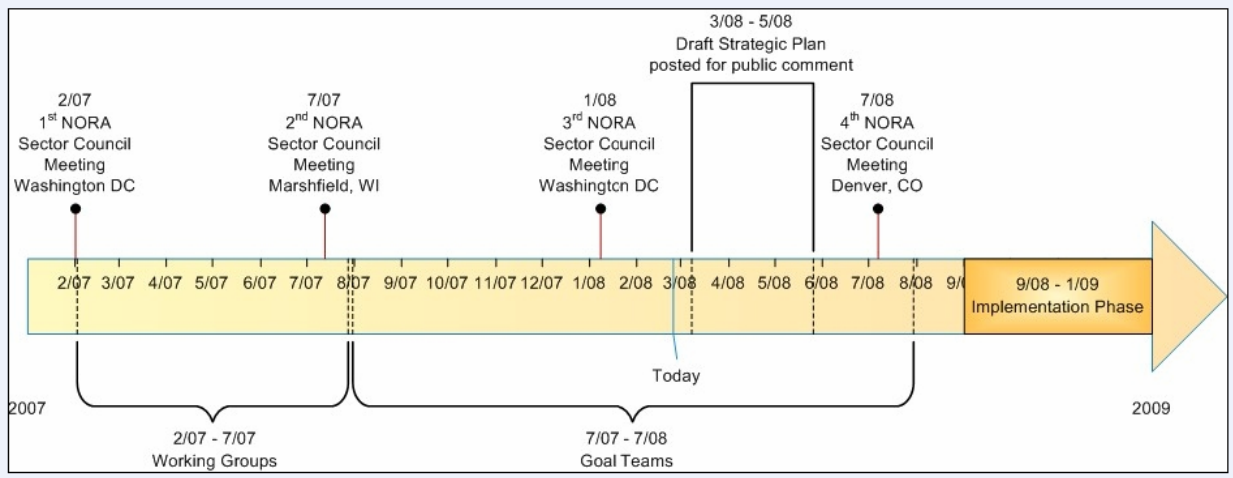
The NORA AgFF Strategic Plan will provide guidance on prioritization of safety and health issues to industry, labor, federal and local governments, as well as experts in professional associations, academia, and public interest/advocacy groups. It can be used to improve health and safety of workers, in each of the three sub-sectors, by providing areas of focus for partnering efforts. The Plan will provide direction to investigators on where information is lacking and what gaps should be addressed in future research, and supply topics of interest to potential funding sources.

What process has been used to develop the goals for the NORA AgFF Strategic Plan?

From December 2005 through December 2006, NIOSH and other NORA partners held 13 town hall meetings throughout the United States gathering

stakeholders to focus and discuss regional or sector specific safety and health issues. These meetings were intended to gain initial public input on occupational health and safety concerns to guide the development of research agendas. The meetings were held in twelve different states and one territory, and 500 of the 1000 stakeholders who participated offered their concerns on which diseases, injuries, exposures, or populations should have the greatest research focus. During this same period, comments were also received through the NORA website and by mail. Transcripts from the meetings, and a searchable database of the comments generated can be found at http://www.cdc.gov/niosh/nora/townhall/default.html.

In October 2006 the Sector Councils were charged with the mission to develop a national sector-specific research agenda and maximize the impact of safe workplace practices based on the research by using partnerships to promote widespread adoption of the improvements. The diagram below illustrates the timeline showing progress of the AgFF Sector Council.



The first AgFF Sector Council meeting was held in February 2007, and council priorities were determined based on available surveillance information, council member expertise, and comments received from the Town Hall meetings. Members were divided into “working groups” (Surveillance, Vulnerable Populations, Outreach, Agriculture, Forestry, and Fishing) focusing on these topics, and were instructed to determine specific issues for each topic. At the July 2007 meeting, the Council decided that Agriculture, Forestry, and Fishing should be divided into separate Health and Safety emphasis areas. Council members were reassigned to “Goal Teams” who were given the task of determining the Strategic Goal for their topic and developing a list of Intermediate Goals and corresponding Action Steps to support them. The goal teams were formed to develop **Strategic Goals** and implementation strategies for the following areas:

- Surveillance
- Vulnerable workers
- Outreach
- Agriculture safety
- Agriculture health
- Forestry safety
- Forestry health
- Commercial fishing safety
- Commercial fishing health

The goals and steps were reviewed by the full council at the January 2008 meeting, with the additional instruction to prioritize the **Intermediate Goals** and associated **Action Steps**. The AgFF Council Goal Teams have collaborated to develop the strategic goals, intermediate goals, and action steps in this document.

Throughout this process, the availability of multiple means of communication (in-person meetings, teleconferences, and e-mail) have enabled the council members and goal teams to discuss and develop sections of the plan and reach agreement on several issues that required further refinement. Among these was the concern about bystanders: people who were not workers, but either short-term assistants, family members or people in the physical vicinity of work operations who might receive injury from the work being performed. Additionally, the definition of 'vulnerable workers' went through several revisions. For production agriculture, some items were debated because, while they do not have an immediate effect on worker safety in the workplace, they are associated with the industry and can have a significant effect on the workers, e.g., global trade, housing, and pesticide-contaminated clothing.

The AgFF Sector Council Strategic Plan is a living document. The contents of this document will continue to be considered and revised as additional research is completed, comments are received, or new issues arise.

How can you become involved with the NORA AgFF Program?
The membership of the current NORA AgFF Council (authors of this document) can be found at http://www.cdc.gov/niosh/nora/councils/agff/planpart.html.

There are several different ways to be involved with the AgFF Sector Program:

Corresponding Member
As a Corresponding Member you would be kept informed of Council activities, provide input on issues to be discussed, and review draft documents. Some Corresponding Members may be asked to join workgroups and Goal Teams on specific topics or to later join as full council members when openings arise. Contact the Sector Coordinator Brad Husberg (BHusberg@cdc.gov) with questions or to volunteer as a Corresponding Member.

Partnership

Partners can participate in a wide range of activities such as offering comments on the Sector research agenda, participating in research, translating research findings into Sector-appropriate information products, implementing research results and recommendations, or disseminating information. If you or your organization is interested in partnering on a particular strategic or intermediate goal, please contact the NORA AgFF Sector Coordinator Brad Husberg at BHusberg@cdc.gov.

Public Comment

We are looking for input in the form of recommended additions, expressions of support, or modifications or deletions from the draft list of goals and goal topics. The draft NORA AgFF Research Agenda will be posted on the internet until June, 2008, for public review. We invite your comments and suggestions. There are two ways to comment:

1) Access the Online form at: http://www.cdc.gov/niosh/nora/comment/public/

2) Send an email with the subject line "**AgFFDraftMar2008: Comments"** to noracoordinator@cdc.gov

Comments will be accepted through June 30, 2008.

STRATEGIC GOAL 1 – SURVEILLANCE

1. STRATEGIC GOAL - Improve surveillance within the Agriculture, Forestry, and Fishing Sector to describe: the nature, extent, and economic burden of occupational illnesses, injuries, and fatalities; occupational hazards; and worker populations at risk for adverse health outcomes.

Public health surveillance is an essential part of any public health prevention program [Halperin 1992]. These data define what populations are at risk for injury or illnesses and assess the impact of intervention programs by tracking changes over time, while providing the means of identifying new and emerging health issues. Surveillance for the AgFF sector is sparse, and is only adequate for occupational fatal injuries. Non-fatal injuries and illnesses, and illness-related deaths are not adequately tracked at this time [National Academy of Sciences 2007]. Progress has been made in some areas, such as pesticide poisoning surveillance and injury surveillance for youths on farms [NIOSH 2006; NIOSH 2008], but these advances have not been extended to cover other illnesses or farm populations. In addition, information is limited on the number and types of workers at risk within this sector. Finally, the surveillance data that are available are not always readily available to those who need the data to take preventative actions [National Academy of Sciences 2007]. All these areas need major improvements if the occupational health of this sector is to be significantly increased. In response to these needs, three intermediate goals have been set: improve data on the work force within the AgFF sector; improve occupational health surveillance in all its forms (e.g., illnesses, injuries, exposures, hazards) within the AgFF sector; and increase data access to those who need these data to take preventative actions within the AgFF sector.

Intermediate Goal 1.1 - Improve national and state-level illness, injury, hazard, and exposure surveillance by utilizing existing data systems or creating new databases to identify injuries, illnesses, hazards, and exposures within the AgFF sector.

Better surveillance data are needed to define the occupational injury and illness burden of workers in the AgFF sector. This will require the use of population-based and case-based surveillance methods. These data are needed at the national, state, and local level to help define intervention priorities, as well as track changes in these conditions over time. Hazard and exposure surveillance data are also needed to better understand the exposures workers in this sector face at work. This will require enhancing existing, or creating new data systems to provide more timely information on occupational illnesses, injuries, and economic costs among detailed sub-sectors within the AgFF sector. It will also necessitate developing hazard and exposure surveillance systems to describe

hazards within detailed sub-sectors of the AgFF sector, and to assess the use of Person Protective Technology/Personal Protective Equipment (PPT/PPE) to reduce the risks these hazards pose. These programs should be flexible enough to be used down to the state level, and where possible, down to the community, or employer level.

Action Step 1.1.1 - Assess the available surveillance for all sub-sectors of the AgFF sector and identify gaps in the existing systems. Target: 2009.

Action Step 1.1.2 - Provide analyses of existing surveillance data to the level of detail possible (e.g., type of outcome, cause, demographic characteristics, incidence and/or prevalence) for each sub-sector of the AgFF sector. Target: 2009.

Action Step 1.1.3 - Hold a national meeting of surveillance experts and stakeholders to assess the current status of AgFF health surveillance systems, to identify new approaches to conducting health surveillance for all AgFF sub-sectors, and to identify existing or new partners for conducting AgFF health surveillance (recommendation from the National Academy of Sciences' [2007] NIOSH Agriculture Program Review Committee). Target: 2009.

Action Step 1.1.4 - The Coast Guard, working with NIOSH, will develop an improved and realistic data collection regime for improving what is learned from casualty investigations within the commercial fishing industry. Target: 2008.

Action Step 1.1.5 - Work with U.S. Department of Agriculture National Agricultural Statistics Service (USDA-NASS) and the U.S. Bureau of the Census on assessing the feasibility of conducting occupational injury and illness surveillance within the forestry industry. Target: 2009.

Action Step 1.1.6 - Maintain and expand existing surveillance systems, including childhood agricultural injury surveillance, to fill identified gaps and increase the utility of the data for prevention activities. Target: 2013.

Action Step 1.1.7 - Increase the use of subject matter experts in the review of case-based surveillance reports (e.g., NIOSH Fatality Assessment and Control Evaluation [FACE] reports, State occupational illness investigation reports) to improve the accuracy of information, and to improve intervention recommendations provided in such reports. Target: 2009.

Action Step 1.1.8 - In collaboration with the U.S. Coast Guard, expand the NIOSH Commercial Fishing Injury Database (CFID) to other regions of the US. Target: 2011.

Action Step 1.1.9 - Incorporate variables into existing or new surveillance systems to facilitate the identification of vulnerable worker populations. Target: 2012.

Action Step 1.1.10 - Improve comparability of research data over time by encouraging researchers to utilize consensus terms and definitions from the Dictionary of Terms for Agricultural Safety & Health Professionals in their surveillance systems. Target: 2012.

Action Step 1.1.11 - Encourage utilization of the preferred categorical variables from the Dictionary of Terms for Agricultural Safety & Health Professionals in new surveillance systems. Target: 2012.

Action Step 1.1.12 - Examine new occupational injury and illness data collection approaches (include pilot testing and evaluation) and implement those that are shown to be effective in filling data gaps. Target: 2018.

Action Step 1.1.13 - Develop coding software to assign occupation and industry codes to public health data sources that contain occupation and industry narratives. Target: 2012.

Intermediate Goal 1.2 - Improve worker demographic information at the national and state level by enhancing existing employment demographic data or creating new systems to better characterize the workforce within each AgFF sub- sector.

To define who is at risk and accurately calculate injury and illness rates within the AgFF sector, better employment data are needed. To accomplish this goal, existing demographic data need to be expanded to provide workforce estimates of the total number of workers, annual average number of workers, and hours worked by detailed sub-sectors within the AgFF sector. Where data systems do not exist, new employment data systems need to be developed. Finally, demographic data systems will need to be improved to provide accurate workforce estimates of documented and undocumented workers within the AgFF sector.

Action Step 1.2.1 - Work with the Bureau of Labor Statistics (BLS) and the U.S. Bureau of the Census to make employment estimates (both hours worked and numbers employed) available to the public for detailed sub-sectors within the AgFF sector at the state-level. Target: 2011.

Action Step 1.2.2 - Work with the United States Department of Agriculture – National Agricultural Statistics Service (USDA – NASS) to increase the level of detail provided in their quarterly hired farm worker reports. This would include

providing state-level estimates of farm labor usage by detailed type of farming operation. Target: 2011.

Action Step 1.2.3 - Work with U.S. Department of Labor's Education and Training Administration (USDOL-ETA) to use data collected from the National Agricultural Workers Survey (NAWS) to develop better estimates of the number of workers employed on crop operations in the US, and the percentage that are undocumented. Target: 2011.

Action Step 1.2.4 - Work with U.S. Coast Guard and National Marine Fisheries Service to apply the NIOSH methodology to estimate the size and makeup of the commercial fishing workforce population by fishery. Target: West Coast, 2008; East Coast, 2009; Gulf of Mexico, 2010.

Action Step 1.2.5 - Work with USDOL-ETA to determine the ability of the NAWS to provide regional and state-level worker demographic information. Target: 2010.

Action Step 1.2.6 - Work with USDA-NASS to assess if the USDA Census of Agriculture could be expanded to include the forestry sector, including the collection of workforce data. Target: 2010.

Action Step 1.2.7 - Incorporate variables into existing or new demographic data collection systems to facilitate the identification of vulnerable worker populations. Target 2012.

Action Step 1.2.8 - Work with USDA-NASS, USDOL-ETA, BLS, and the Bureau of the Census to assess the feasibility of collecting information on undocumented workers in non-farming sectors of the AgFF sector (i.e., logging and fishing establishments). Target: 2010.

Action Step 1.2.9 **-** Work with USDOL-ETA to include livestock operations in the NAWS. Target: 2011.

Action Step 1.2.10 **-** Examine new demographic data collection approaches (include pilot testing and evaluation), and implement those that are shown to be effective in filling data gaps. Target: 2018.

Intermediate Goal 1.3 - Ensure that occupational illness, injury, and fatality surveillance data for the AgFF sector are readily available to workers, employers, intramural and extramural research scientists and the public in a timely manner.

The third major aspect of surveillance is getting the information to those who need the data in a timely fashion. This could be accomplished through a variety

of approaches, including: providing surveillance findings and public use surveillance data sets on the internet; working with federal agencies and others to improve public access to surveillance data; and promoting and expanding existing services to fill special data requests from the public in a timely manner.

Action Step 1.3.1 - Work with USDA-NASS to release preliminary results of all NIOSH-sponsored surveys within 9 months of completing data collection. Target: 2008.

Action Step 1.3.2 - Provide summary results from NIOSH-sponsored surveys conduct by USDA-NASS within 12 months of USDA-NASS completing data collection. Target: 2009.

Action Step 1.3.3 - Work with BLS to release detailed results from the Census of Fatal Occupational Injuries (CFOI) for the AgFF sectors within 6 months of the initial release of CFOI data by BLS. Target: 2010.

Action Step 1.3.4 - Work with USDA-NASS to make public use data sets available for all NIOSH-sponsored surveys within 9 months of completing data collection. Target: 2008.

Action Step 1.3.5 - NIOSH has developed the Commercial Fishing Injury Database to identify risk factors associated with fishing incidents. Using these data, NIOSH will partner with the Coast Guard and health and regional safety organizations to develop occupational safety and health recommendations for the commercial fishing industry in different parts of the US. Target: West Coast, 2007; East Coast, 2008; Gulf of Mexico, 2009.

Action Step 1.3.6 - Work with USDA-NASS to reduce the current time needed to receive approval to fill special data requests from NIOSH-sponsored surveys. Target: 2008.

Action Step 1.3.7 - Work with USDOL, ETA to release NAWS results within 1 year of collection of the data.

Action Step 1.3.8 - Work with BLS to better market their services for filling special data requests from their CFOI, SOII, and employment data sets. Target: 2010.

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STRATEGIC GOAL 2 – Vulnerable Workers

Background
Some workers experience disproportionate safety and health risks within the AgFF sector because they are less able to advocate for themselves, seek protections, and access resources than others employed in AgFF. The increased vulnerability of these workers is mulitfactorial and relates to workers' ages, English language skills, literacy levels, mobility, migration, work arrangement, socioeconomic status, culture, ethnicity, and physical or cognitive ability. For example, data on fatal occupational injuries suggest that immigrant workers, workers younger than 18 years old, and workers over 65 years old are all at increased risk. The NORA AgFF Sector Council is currently formulating more detailed definitions and criteria for vulnerable workers which will be added later to this document. The definitions will be helpful in designing a future action plan.

Recent Immigrant and Latino Workers
Foreign-born workers who have recently immigrated may have a constellation of characteristics such as limited English skills coupled with dire economic need that contribute to their vulnerability as workers. The Pew Hispanic Center reported that, in 2005, 7 million, or 68%, of the 10.3 million undocumented people in the U.S. worked. Mexicans make up by far the largest group of undocumented immigrants at 5.9 million (57%), and another 2.5 million undocumented immigrants (24%) are from other Latin American countries. [Passel, 2005] Latinos make up the bulk of both documented and undocumented foreign-born workers nationally and constitute a sizeable percentage of the workforce in the AgFF sectors.

Latino AgFF workers have experienced elevated and increasing occupational fatality rates for every year since 1992, when the Census of Fatal Occupational Injuries was introduced, through 2005 (the most recent year for which data is available). Although underreporting of non-fatal injuries is a concern in this population, the Medical Expenditure Panel Survey has found that Latino AgFF workers also experience higher rates of non-fatal lost-work-time injuries than other segments of the AgFF workforce.

The proportion of the AgFF sector workforce classified as Latino has grown rapidly, fueled primarily by enormous increases in foreign-born Latino workers, the majority of whom are of Mexican origin. Latino AgFF workers have lower rates of health insurance coverage, lower rates of unionization, lower average hourly wages, lower average educational levels, fewer years of work experience, and are concentrated in lower-skilled and more hazardous occupations such as tractor drivers, fisherman, and forestry workers. As noted, the economic needs of many Latino AgFF workers make them less likely to challenge or to walk away from unsafe working conditions and more likely to accept poor work conditions.

Their economic situation and the temporary, seasonal nature of much agricultural, forestry, and fishing work force many Latino AgFF workers to change occupations within the sector (mobility) and to physically relocate themselves and their families (migration) depending on available work. The contingent work status of the majority of AgFF workers, as they are often employed by subcontractors rather than owner/operators, also contributes to the phenomenon of mobility and migration common in this workforce. The role of immigration status, language skills, inexperience, age, and other personal attributes in a workers' vulnerability may or may not be compounded by specific discriminatory activity related to ethnicity or by economic exploitation.

These conditions may not be unique to Latino AgFF sector workers; other immigrant workers likely face similar conditions and challenges that may go unrecognized. Each of these circumstances leads to increased vulnerability of these workers because they result in social and economic marginalization that isolates the worker from services (e.g., healthcare), resources (e.g., training), and protections that are available to the AgFF workforce overall.

Young Workers

Workers under the age of 18 years have increased rates of fatal traumatic injuries compared to the youth workforce as a whole [Hard and Myers 2006]. Work tradition in some cases, and economic need in others, lead to children working in family or community businesses as unpaid or hired workers. Unfortunately, their physical and cognitive development and lack of experience make AgFF especially dangerous for them which some evidence shows makes them more vulnerable to work-related injuries than their adult counterparts. NIOSH has been identified by Congress as the lead federal agency to address all farm-related injuries and fatalities (both occupational and non-occupational) in the U.S. [Castillo 1998].

Elderly Workers

Elderly AgFF workers (those workers over the age of 65 years) are at increased risk of fatal occupational injury due to a decreased physical and cognitive ability to perform their job tasks. This population is increasing with the overall aging of the AgFF workforce. Elderly workers are particularly vulnerable in part because of their experience and reliance on routine actions, which may make them slower to react to non-routine situations. Reduced physical and cognitive abilities occur as part of the natural aging process and are progressive in nature, but economic pressures often influence the elderly to continue working for as long as possible.

Physically- and Cognitively-disabled Workers

Similarly to elderly workers, physically- and cognitively- disabled AgFF workers are at higher risk of occupational injury as a result of decreased ability to perform their job tasks and respond to non-routine or emergency situations.

2. Strategic Goal: Reduce excessive deleterious health and safety outcomes in workers made vulnerable by their inability to safeguard their own needs and interests.

Circumstances and characteristics leading to vulnerability are defined here to include extremes in age (under 18 and over 65 years), gender, limited- English language and literacy, mobility and migration, disability, socio-economic status, documentation status, ethnicity and culture.

Intermediate Goal 2.1 - Identify and describe "vulnerable workers" in agriculture, forestry and fishing, and their deleterious health and safety outcomes.

This Intermediate Goal and Action Steps reference the Surveillance segment of this plan to provide for data collection on vulnerable workers.

Action Step 2.1.1 - Define variables for inclusion in surveillance systems that describe “vulnerable workers”. Target: 2009**.**

Action Step 2.1.2 - Describe “vulnerable workers” by location and numbers. Target: 2009**.**

Action Step 2.1.3 - Identify patterns and trends of excess morbidity and mortality for vulnerable workers. Target: 2009**.**

Action Step 2.1.4 - Identify health outcomes for each of the vulnerable worker groups that are not traditionally categorized as occupational but that substantially impact the work life of that group. Target: 2009**.**

Examples include accumulation of pesticides on clothing because of limited laundry facilities and health hazards from unsafe housing.

Intermediate Goal 2.2 - Improve data collection and existing databases to provide information on safety and health disparities among vulnerable workers.

Action Step 2.2.1 - Establish data-sharing mechanisms among universities, government agencies, and community-based and non-governmental organizations. Target: 2018.

Action Step 2.2.2 - Incorporate variables defined in 2.1.1 into 100% of NIOSH surveillance programs. Target: 2018.

Action Step 2.2.3 - Develop methods to track workers who are mobile geographically or across industries to be able to assess long-term health effects. Target: 2018.

Action Step 2.2.4 - Seek new data collection mechanisms where gaps exist. Target: 2018.

Intermediate Goal 2.3 - Improve and strengthen government and workplace outreach safety and health programs to vulnerable workers.

This Intermediate Goal and Action Steps reference Intermediate Goal 3.3 of the Outreach segment of this plan to provide a focus on vulnerable workers.

Action Step 2.3.1 - Inventory and review available outreach materials. Target: 2018.

Action Step 2.3.2 - Ensure proper reading level and appropriate translation of documents and materials to reach various vulnerable workers. Target: 2018.

Action Step 2.3.3 - Identify and produce appropriate materials for different groups where gaps exist. Target: 2018.

Action Step 2.3.4 - Establish partnerships to coordinate efforts with employers and organizations interested in the health and safety of vulnerable workers. Target: 2018.

Intermediate Goal 2.4 - Improve, strengthen and raise awareness among vulnerable workers about available programs and services.

Action Step 2.4.1 - Develop a list of community-based and non-governmental organizations, employer associations, organized labor, state and federal agencies interested in the health and safety of vulnerable workers and then engage these entities as partners when appropriate. Target: 2018.

Action Step 2.4.2 - Develop a list of governmental and non-governmental organizations tasked with providing education, training, and services to vulnerable workers about health and safety and engage these entities as partners when appropriate. Target: 2018.

Action Step 2.4.3 - Conduct presentations on special needs, rights and what is currently available to vulnerable workers to groups that are interested in vulnerable workers. Target: 2018.

Action Step 2.4.4 - Establish a mechanism to encourage coordinated efforts among organizations interested in the health and safety of vulnerable workers. Target: 2018.

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STRATEGIC GOAL 3 – Outreach, Communications, and Partnerships

3. Strategic Goal: Develop partnerships and collaborative efforts to maintain discussion of health and safety issues and to move validated health and safety improvements into agricultural, forestry and fishing workplaces.

Enhancing surveillance, producing guidelines on health and safety for the agriculture, fishing and forestry sectors, and special attention to vulnerable populations are the crucial substantive tasks of this sector council. To properly implement the strategic plan that the AgFF Sector Council produces, there will have to be an appropriate plan of action to disseminate what is learned to all entities that have a stake in improving the health and safety of workers and producers in these industries. Whenever a safe method of production is ready for application, it is incumbent upon the AgFF research community to be sure that all affected parties know about the method and are encouraged through a variety of means to adopt it. This will begin with establishing partnerships and collaborations with the Council and other stakeholders. Then, proven methods of safe practice in the sector industries will be identified. Finally, a wide variety of outreach methods will be applied to assure that the best health and safety practices are fully implemented in agriculture, fishing and forestry.

Intermediate Goal 3.1 - Form collaborative efforts with key stakeholders to:
1) provide yearly assessments of current and emerging major occupational health and safety concerns and
2) prioritize interventions and help to disseminate safety information to workers and employers.

Assuring the implementation of best practices techniques and equipment that promote health and safety in these industries will require the “buy-in” of as much of the sector as possible. One of the best ways to ensure that participation and the adoption of best practices is to have a broad and strong set of stakeholders involved. These stakeholders must be encouraged to communicate their needs as well as be prepared to accept and adopt the latest and best health and safety methods available to the agriculture, fishing and forestry sector.

Action Step 3.1.1 - Identify stakeholders: policy makers, federal and state agencies, safety and health researchers and practitioners, agribusiness, agricultural producer organizations, union representatives, farm labor contractors and farmworker representatives, commercial fishermen, extension forestry services, youth-serving and community-based organizations (i.e., Agricultural Safety and Health Council of America members).

Action Step 3.1.2 - Meetings: arrange quarterly conference calls and one in-person meeting each year from 2009 to 2018.
Action Step 3.1.3 - With partners, prioritize interventions to disseminate.

Intermediate Goal 3.2 - Annually, identify practical and "proven" occupational safety and health interventions, then encourage and facilitate the adoption of work practices deemed most likely to minimize disease and injury.

It is critical that the best practices in each part of the sector be catalogued and then updated on a regular basis. Such best practices may include methods developed by American sector actors and by similar industries in other countries. As best practices are identified, it will be crucial that they are approved and disseminated as rapidly and thoroughly as possible in order to assure the health and safety of the target groups in each industry.

Action Step 3.2.1 - Request evaluations by NIOSH Agricultural Centers, USDA, Extension services, universities and other partners to review strategies and interventions, and assess current state of training needs for effectiveness. Target: 2011.

Action Step 3.2.2 - Catalog proven interventions yearly after 2011. These interventions include: incentives, best practices, guidelines, rulemaking, new methods and technologies.

Action Step 3.2.3 - Identify gaps in health and safety best practices and methods. Target: 2011.

Intermediate Goal 3.3 - Use innovative social marketing and educational techniques to influence knowledge, attitudes and practices of agricultural producers and workers, commercial fishermen, and loggers.

The methods of dissemination of best practices in each industry must be varied and innovative. Farmers, fishermen, loggers and their employees are unlikely to change their behaviors due to one single input of information. Nor is information alone likely to be sufficient in each instance. The panoply of activities that induce positive change must be used. Moreover, research on the best health and safety techniques and equipment must be updated regularly and the results of such research promulgated to all parts of the agriculture, fishing and forestry sector.

Action Step 3.3.1 - Conduct social marketing research on economic and social factors impacting occupational safety practices. Research best methods to influence behaviors of agricultural producers and workers, commercial fishermen, and loggers. Target: 2011

Action Step 3.3.2 - Develop evidence-based training programs (including training the trainer programs), models, materials, incentives, and methods and regularly update training materials and programs that are culturally, linguistically, and educationally appropriate. Focus training for employers and workers in the AgFF sector, health and safety practitioners, regulatory personnel, vocational teachers, extension agents and others.

Action Step 3.3.3 - Assess annually the training programs, materials, and methods.

Action Step 3.3.4 - Promote the continuous dissemination and use of best practices, materials, and methods.

Action Step 3.3.5 - Annually convene a national state-of-the-science conference on training issues, resources, and needs from 2009 to 2018.

Action Step 3.3.6 - Promote and facilitate safety and health training at AgFF stakeholder conferences.

Action Step 3.3.7 - Facilitate the development of public awareness campaigns regarding AgFF safety and health based on proven and appropriate techniques.

Action Step 3.3.8 - Ensure that the general public, professionals, and other stakeholders have access to validated health and safety interventions that protect bystanders (children, visitors, and others) from hazardous work conditions.

STRATEGIC GOAL 4 – Agriculture Safety

4. Strategic Goal: Reduce the number, rate and severity of traumatic injuries and deaths involving hazards of production agriculture and support activities.

Agricultural production (i.e., farming) is one of the most hazardous industry sectors in the US. Between 1992 and 2005, 7,571 farmers and farm workers died from injuries sustained while performing farm work in the US, for an average annual fatality rate of 26 deaths per 100,000 workers [NIOSH 2006]. Farm tractors accounted for 2,795 (37%) of these deaths, although motor vehicles, agricultural machines, animals, and working surfaces associated with falls were also common causes of death on farms in the U.S. [NIOSH 2006; Hard 2002]. Between 1992 and 2004, workers over the age of 54 years accounted for over half of all farm work deaths and 65 percent of all tractor deaths [Myers 2007a]. Tractors and farm machinery were identified as the leading cause of death for youths less than 16 years of age on farms [Goldcamp 2004]. For non-fatal injuries, an average of 93,000 non-fatal OSHA recordable injuries occurred on farms during for the years 2001 and 2004, for a work-related injury rate of 4.9 restricted activity injuries per 100 workers [NIOSH 2006]. The most common sources of these injuries were working surfaces associated with falls (22%), animals (19%), machinery (12%), and hand tools (8%) [NIOSH 2008]. Agricultural injuries do not only affect the workers. Bystanders are at risk as well, whether they are adults or children. Because of the concerns raised, NIOSH accepted a lead federal agency role for addressing childhood agricultural injuries.

To address this high fatal and non-fatal injury risk, five intermediate goals are proposed to reduce the overall burden of injury in the agricultural production sector:

Intermediate Goal 4.1 - Reduce number of fatalities due to overturns of tractors in agricultural by 50%, through the use of Roll-Over Protective Structures or similar technologies, by 2018.

Overturns (also called rollovers) usually result in massive traumatic injuries to operators and, with about 130 deaths annually, account for more than half of all tractor-related fatalities. Roll-Over Protective Structure (ROPS) and seat belts prevent fatalities and injuries when tractors overturn, yet 41% of tractors in the United States don't have them, although retrofitting is available for many of them. Many older tractors can be retrofitted and newer, ROPS-equipped tractors can replace tractors too old for retrofitting.

Tractors accounted for 2,795 occupational fatalities to farmer and farm workers between 1992 and 2005 [NIOSH 2006]. Tractor overturns accounted for 1,411 (50%) of these tractor-related worker deaths [NIOSH 2006]. Farmers and farm

workers over the age of 54 years account for 56% of these overturn deaths [Myers 2007a]. Rates of overturn deaths have also been found to be geographically clustered, with the highest rates found in PA, WV, OH, KY, TN, and IL. ROPS and seatbelts are a proven intervention that can prevent most deaths associated with tractor overturns [Reynolds 2000; Springfeldt 1998; Thelin 1998]; however, only 59% of all tractors used on farms in the U.S. are equipped with ROPS [USDA 2008]. Data from Europe suggest that ROPS usage needs to exceed 75% before adequate protection is achieved within the farming workforce [Springfeldt 1996; Springfeldt 1998]. While operator age has been found to be a risk factor for overturn deaths, older farmers have also been identified as a group that own and operate a large number of tractors without ROPS [Sanderson 2006; Loringer 2008]. Other factors related to a low proportion of ROPS on farms are: farms with low annual value of sales; farms that are operated on a part-time basis; and farms with small acreages [Sanderson 2006; Loringer 2008]. Based on what is known about overturn deaths and ROPS use in the US, the following activities are proposed to meet this intermediate goal:

Action Step 4.1.1 - Work to increase the number of older non-ROPS tractors retrofitted with ROPS and seat belts or replaced by ROPS and seatbelts equipped tractors.

Action Step 4.1.2 - Bring awareness to the issue by conducting extensive outreach to production agriculture and get more tractor operators to use a tractor with ROPS and wear seat belts on ROPS-equipped tractors. Outreach materials could include pamphlets, posters, radio and TV ads. Establish rebate programs to encompass the entire nation similar to the recent efforts in New York and Virginia.

Action Step 4.1.3 - Improve surveillance; include economics, intervention cost-effectiveness, epidemiology, behavior, and other human factors, as well as engineering and technology. Because ROPS are proven technology, more research should be done on determining barriers preventing farmers from retrofitting their tractors with ROPS, assessing which tractors are overturning, and identifying where fatalities are occurring.

Partnership groups and coalitions, essential to preventing tractor-related injuries and deaths, should be formed in each region or state. Partners should include, among others, Government Agencies, Employer Associations, Labor Representatives, Tractor Manufacturers, Family Farms, Co-ops, Insurance Companies, Universities, and Ag Centers.

Intermediate Goal 4.2 - Reduce number and rate of fatalities in production agriculture and support activities due to runovers by agricultural field and farmstead machinery by 50% by 2018.

Runovers are the second most common type of death associated with farm tractors in the US, accounting for 759 deaths between 1992 and 2005 [NIOSH 2006]. An additional 240 runover deaths occurred during this time period involving other types of machines [BLS, 2008]. Nearly half of these runovers (485 deaths) involved the operator falling from and being runover by the moving equipment, followed by 270 deaths from being struck by rolling equipment not in normal use (e.g., rolling from brake failure with no one on the equipment, individual by-pass starting a machine while it is in gear), and 244 pedestrians being struck by the equipment during normal equipment use [BLS, 2008]. As with overturns, farmers and farm workers over the age of 54 years account for a significant number of these runover deaths (68%) [Myers 2007b; BLS 2008]. Youths less than 16 years old, and especially those less than 5 years old, are at high risk for being runover by tractors, and other mobile farm equipment [Goldcamp 2004].

Operators and others, including persons providing support services, can be runover by agricultural field or farmstead equipment. Equipment operators, for example, can be runover when they attempt to start or move such equipment from a position other than the recommended operator's station or in a manner contrary to equipment manufacturer recommendations. Operators may also be runover when they are near equipment that continues to move or moves unexpectedly, whether or not the engine is running, or when they attempt to mount equipment that is in motion. In addition, terrain, obstacles, and other factors can contribute to an operator being runover after falling from the equipment operator's station.

Unapproved extra riders, as well as persons authorized to provide training or being trained, can also fall from, exit, or attempt to remount field or farmstead equipment and be runover by it. For example, an extra rider may fall from the fender of an open station tractor, through an operator enclosure doorway, from a platform, or from a host of other places not designed or intended to be occupied while the machine is moving. In addition, unapproved extra riders and trainers/trainees may approach unnoticed or attempt to mount or dismount machines before the equipment has been fully stopped and secured. In some instances a person exiting and assumed to have cleared the area can be runover when the operator resumes equipment operation. In other instances, riders can fall from work platforms not intended for riders but nonetheless used for monitoring or other diagnostic purposes.

A bystander or helper can become a runover victim in a variety of ways even though they are neither riding on nor attempting to mount or dismount the equipment when the runover occurs. For example, a person assisting a tractor

operator to position a tractor making a connection to an implement could be runover by the tractor or the implement. An unsuspecting bystander of any age could be runover in the swept area of a wide machine traveling or turning. An unseen person near or approaching a machine that is moving or put into motion could also become a runover fatality.

The following activities are proposed to meet this intermediate goal:

Action Step 4.2.1 - Partner with producer groups, trade and technical associations, and safety professionals to identify ways to protect operators, helpers, and bystanders (adults or children) exposed to risks of being runover by field or farmstead equipment.

> Performance Measure: Identify persons, tasks, and risk factors associated with runover events, identify commonalities and differences among the types, and evaluate strategies to reduce exposure to being runover by field or farmstead equipment. Target: 2010

Action Step 4.2.2 - Partner with producer groups, trade and technical associations, and safety professionals to identify runover-related problems addressable by technical solutions, then develop and evaluate solutions. Consider also that field and farmstead equipment, production methods and processes, will continue to change as new technologies and capabilities expand. In some instances new forms of hazard may be introduced, such as the potential to be runover by an autonomous or remotely controlled machine during restart or use.

> Performance Measure: Identify the most important three priority runover-related problems requiring engineering solution(s). Target: 2010
>
> Performance Measure: Evaluate studies associated with current runover prevention intervention technologies and develop improved solutions. Target: 2011
>
> Performance Measure: Identify, evaluate, and investigate ways to improve the performance of sensors and systems for enhanced vision and human presence protection, interlock and lockout systems, Global Positioning Systems (GPS) for worker location and activity monitoring, and sensor technologies that could be applied in the production agriculture and service activity workplace as means to address runovers by field or farmstead equipment. Target: 2014
>
> Performance Measure: Develop, evaluate, and implement at least one engineering solution for an identified priority runover-related problem. Target: 2016

Action Step 4.2.3 - Partner with Production Agriculture and Support Activity stakeholders to expand awareness and use of existing, effective runover prevention intervention measures by farmers, ranchers, farmworkers, their families and persons providing support services for production agriculture.

Performance Measure: Identify and evaluate the effectiveness of existing runover prevention intervention measures in use by production agriculture and support activity workers and similar measures employed in other similar work situations. Target: 2010

Performance Measure: Identify obstacles to implementing existing runover prevention intervention measures, identify and increase translation into practice three existing engineering, educational training, or other runover prevention intervention measures. Target: 2011

Performance Measure: Increase awareness of runover hazards and effective prevention intervention measures among 10% of farmers, ranchers, and farmworkers by 33% over a baseline year. Target: 2013

Performance Measure: Document the effectiveness of engineering, educational training, and other runover prevention intervention measures translated into practice. Target: 2016

Action Step 4.2.4 - Responding to the unique needs of an increasingly diverse workforce will not be limited to accommodating persons with disabilities (hearing impairment, physical limitations, or otherwise) but is anticipated to require customized and individualized interventions.

Performance Measure: Identify obstacles to implementing existing runover prevention educational training, identify five educational training interventions and criteria for their use to achieve greatest use in practice and best runover prevention outcomes. Target: 2010

Performance Measure: Improve educational training delivery, and translation into practice, best practices for prevention of runovers to farmers, ranchers, farmworkers, their families and persons providing support services for production agriculture. Target: 2010

Performance Measure: Evaluate innovative educational training or other similar methods that could raise awareness and influence use of runover prevention intervention by farmers, ranchers, farmworkers, their families and persons providing support services for production agriculture. Target: 2014

Intermediate Goal 4.3 - Reduce the number and rate of fatalities in production agriculture and support activities involving agricultural field and farmstead equipment, not covered in 4.1 and 4.2 by 25% by 2018.

Machinery and industrial vehicle deaths not associated with overturns or runovers still accounted for 1,505 deaths between 1992 and 2005 [BLS 2008]. These deaths are more varied in nature, but involve such events as the victim being caught in running machinery (624 deaths), non-highway transportation events excluding overturns and runovers (269 deaths), highway collisions between the farm equipment and other vehicles (154 deaths), being struck by falling parts of the machinery (144 deaths), or equipment contacting electrical lines (72 deaths). As with the overturns and runovers, farmers and farm workers over the 54 years old account for more than half of these deaths (774 deaths), especially those involving other non-highway transportation events where older workers were the victim 71% of the time. To address these other machinery and industrial vehicle risks, the following activities are proposed:

Action Step 4.3.1 - Regularly identify keystone issues e.g. entanglements, operations (dropping, raising, swinging), electrocutions, slips, trips, falls, and collisions.

Action Step 4.3.2 - Develop, expand, and use active surveillance systems to monitor trends and analyze information to determine areas for intervention. Maintain a strong working relationship with Occupational Safety and Health Administration and State Plans (DOSH in the State of Washington) to increase monitoring programs and investigate workplaces with high fatality rates.

Action Step 4.3.3 - Compile a comprehensive inventory of existing educational materials currently in use. Identify means/methods for updating these materials. Develop and conduct workshops and presentations for farmers and organizations with an interest on agricultural safety.

Action Step 4.3.4 - Enhance/expand safety awareness with farmers and farm families; develop an agriculture training or education kit that includes a sample of accident prevention program, safety videos, farm safety tips and the advantages of having a safe and healthful workplace.

Action Step 4.3.5 - Utilize approaches such as health hazard evaluations, hazard identifications, and best practices to develop guidelines for safe operating conditions.

Action Step 4.3.6 - Incorporate economic issues/benefits of maintaining a safe working environment (lost family income, medical costs, lawsuits and legal issues, tax benefits) and incorporating proven safety steps into safety training.

Intermediate Goal 4.4 - Reduce the number rate and severity of non-fatal injuries (OSHA recordable type) in production agriculture and support activities involving agricultural field and farmstead equipment by 25% by 2018.

Data from NIOSH estimate that there was an average of 93,000 non-fatal OSHA recordable injuries on farms during the years 2001 and 2004 [NIOSH 2006]. Machinery (e.g., balers, mowers, augers, combines) and industrial vehicles (e.g., farm tractors, forklifts) accounted for 12% of these injuries [NIOSH 2008]. Machinery accounted for 7,400 injuries while industrial vehicles, 4,000 injuries. For machinery-related injuries, 38% involved the victim getting caught in running equipment, followed by being struck by the machine or parts of the machine (26% injuries of machinery injuries). For industrial vehicles, half the injuries involved off-road vehicle incidents, which includes overturns and falls from running equipment. Unlike fatal injuries associated with machines and industrial vehicles, most non-fatal injuries occur to farmers and farm workers less than 55 years old (65%). Workers over the age of 54 years did account for 45% of the industrial vehicle injuries, however. To reduce these non-fatal machinery and industrial vehicle injuries by 25% over the next 10 years, the following activities are proposed:

Action Step 4.4.1 - Regularly identify keystone issues based on active surveillance systems. Maintain strong working relationships with Occupational Safety and Health Administration and State Plans to expand monitoring programs and investigate workplaces with high accident rates.

Action Step 4.4.2 - Compile a comprehensive inventory of existing educational materials currently in use. Identify means/methods for updating these materials. Develop and conduct workshops and presentations for farmers and organizations with an interest on agricultural safety.

Action Step 4.4.3 - Enhance/expand safety awareness with farmers and farm families; develop an agriculture training or education kit that includes a sample accident prevention program, safety videos, farm safety tips and the advantages of having a safe and healthful workplace.

Action Step 4.4.4 - Utilize approaches such as health hazard evaluations, hazard identifications, and best practices to develop guidelines for safe operating conditions.

Action Step 4.4.5 - Incorporate economic issues/benefits of maintaining a safe working environment (lost family income, medical costs, lawsuits and legal issues, tax benefits) and incorporating proven safety steps into safety training.

Intermediate Goal 4.5 - Reduce the number, rate, and severity of non-fatal injuries (OSHA recordable type) and the number and rate of fatalities in production agriculture and support activities not covered in 4.1, 4.2, 4.3 and 4.4 by 25% by 2018.

Examples: livestock, tools, buildings, bins, and structures.

Non-machinery causes of deaths accounted for 3,479 fatalities in production agriculture between 1992 and 2005. These fatal agricultural injuries involved trucks (743 deaths) associated with highway transportation events, working surfaces (345 deaths) associated with falls, animals (317 deaths), and ammunition (249 deaths) associated with assaults and self-inflicted injuries [BLS 2008]. Farmers and farm workers over the age of 54 years have been found to account for about 63% of the animal-related deaths reported in agriculture [Hard 2002; BLS 2008]. For the 93,000 average annual non-fatal OSHA recordable injuries estimated to occur on farms by NIOSH, working surfaces associated with falls (22%), animals (19%), and hand tools (8%) were identified as the most common sources of injury [NIOSH 2008]. Nearly three-quarters of these non-fatal injuries occur to workers less than 55 years old, with this age group accounting for just over three quarters of the animal-related injuries and 65% of the working surface-related injuries associated with falls. To address this broad range of fatal and non-fatal risks, the following activities are proposed:

Action Step 4.5.1 - Work with USDA-NASS and NIOSH to support NIOSH intramural efforts to conduct injury surveillance to provide state-level data that identifies and describes the nature and extent of non-fatal work-related injury according to the preferred categorical variables in the *Dictionary of Terms for AgFF Professionals*.

Action Step 4.5.2 - Analyze data from USDA-NASS, NIOSH and refereed journals to determine major causes of non-fatal agricultural work-related injuries and to identify preventive strategies that could prevent these injuries.

Action Step 4.5.3 - Work with USDA, NIOSH, the Agricultural Safety and Health Council of American (ASHCA), and other similar partners to gain increased political and financial resources to reduce non-fatal work-related injury.

Action Step 4.5.4 - Work with NIOSH Ag Centers, cooperative extension safety specialists, farm bureau safety leaders, and other similar groups of safety and health professionals to develop research-based model safety education and

intervention tools and programs for non-fatal work-related injury for application at national, state, county and community levels.

Action Step 4.5.5 - Work with ASHCA, the National Institute for Farm Safety (NIFS), NIOSH Ag Centers, cooperative extension safety specialists, farm bureau safety leaders, and other similar groups of safety and health professionals to implement and distribute model safety education and intervention tools and programs for non-fatal work-related injury.

Action Step 4.5.6 - Work with ASHCA, major farm organizations, agribusiness and the farm media to increase the value of working to better manage hazards and risks with exposed populations to non-fatal work-related injury.

Action Step 4.5.7 – Identify best options for protecting non-workers from hazards in and around production agriculture and support activities.

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STRATEGIC GOAL 5 – Agriculture Health

5. Strategic Goal: Improve the health and well-being of agricultural workers by reducing occupational causes or contributing factors to acute and chronic illness and disease.

Agricultural workers face an exceptionally wide range of acute and chronic health exposures at work. Agricultural work is hard work and involves long hours under difficult conditions and repetitive exposure to musculoskeletal strains and sprains, respiratory hazards, toxic chemicals, psychological stresses and a variety of zoonotic diseases. These problems have been recognized by the agricultural health and safety community for some time. Unfortunately the salient issues, clearly identified in the groundbreaking report, "Agriculture at Risk: A Report to the Nation (1989)" [Merchant 1989] remain a significant concern.

Speaking of the under reporting of farm injuries the report noted that, "These statistics… ignore the wide range of agriculturally related diseases that have been documented in several epidemiologic studies, but for which adequate state or national statistics are not available." [Merchant 1989] The data collection challenge remains a problem and is addressed throughout this document. The five intermediate goals which follow are not meant to be all inclusive but do represent decisions of the council regarding priority attention.

The 1989 report raised the specter of the "liquidation" of the agricultural workforce due to injury and disease. Thoughtful and focused research around these goals along with the identification and implementation of best practices can reverse these historic trends.

Intermediate Goal 5.1 - Reduce the incidence and prevalence of musculoskeletal disorders (MSD) associated with work practices and production agriculture.

Among available general industry data sources (Bureau of Labor Statistics, National Safety Council, Liberty Mutual Annual Workplace Safety Index) strains and sprains consistently comprise the largest share of the most frequent cause of workplace injuries and illnesses. General agreement exists that, "while there is not good national data on the extent of these injuries and illnesses either within agriculture or relative to other industries, there is growing evidence that this problem likely exceeds all other types of injury and disease in the agricultural industry." [Chapman 2001] Agricultural work encompasses the full range of identified musculoskeletal injury risk criteria including force, repetition, duration, posture, and metabolic factors. Helpful research and successful intervention projects have been initiated on a modest scale in some industry segments, the nursery, and wine industries for example [Janowitz 1998, Meyers 2006] but significantly more is needed.

Action Step 5.1.1 - Conduct continued research on MSD risk factors as they relate to workers in the agricultural sector.

Action Step 5.1.2 - Conduct research on alternative methods to accomplish tasks with high incident rates of MSD.

Action Step 5.1.3 - Develop best practice models for MSD prevention in specific agricultural operations.

Action Step 5.1.4 - Conduct research on MSD injury recovery and return to work in an agricultural setting that provides guidelines to health care providers, injured workers and employers.

Action Step 5.1.5 - Develop / distribute guidelines for prevention of musculoskeletal injuries.

Action Step 5.1.6 - Continue research into and development and validation of MSD exposure assessment tools as well as the etiology of MSD's.

Action Step 5.1.7 - Improve utilization of the NIOSH Agricultural Centers to address regional work, and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research, outreach and education.

Intermediate Goal 5.2 - Reduce acute and chronic respiratory disease caused, or exacerbated by, agricultural exposures including asthma, chronic obstructive pulmonary disease, and interstitial and infectious diseases of the respiratory system.

A wide range of respiratory diseases have been associated with exposures in agriculture [Schenker 1998]. These diseases include effects on the upper respiratory tract, the airways, and the pulmonary interstitum. In addition, exposures to biologic agents (bacteria, mycobacterium, viruses, fungi) in agricultural processes may result in respiratory infections. Upper respiratory tract effects include inflammation of the mucous membranes in the naso-pharynx and sinuses. Airway disorders cover a wide range of diseases including upper airway irritation, asthma and asthma-like syndrome, toxic tracheo-bronchitis and chronic airflow obstruction. Interstitial diseases include fibrosis, organic dust toxic syndrome and hypersensitivity pneumonitis. A contributing risk factor is that agricultural work is associated with very high exposures to respiratory toxicants, often orders of magnitude higher than in other occupational settings [Doekes 1998]. Epidemiologic studies have documented increased respiratory morbidity and mortality in a wide range of agricultural settings. This is of particular concern because cigarette smoking prevalence is lower among farmers and farmworkers

than in the general population. A challenge to reducing respiratory disease in agriculture is that farmers do not believe the risk to be increased, and use of respiratory protection is limited [Schenker 2002]. As with many hazards in agriculture, specific risks vary greatly with the climate, geographic region and agricultural practices. For example, hypersensitivity pneumonitis is a greater risk in regions with increased moisture, which is conducive to mold growth. Conversely, dry climate farming in the western states is a greater risk for dust-induced airflow obstruction and restrictive lung disease. Some respiratory diseases such as tuberculosis may be increased among immigrant farmworkers, but dissemination may be associated with agricultural practices and/or housing conditions [Ciesielski 1991].

Action Step 5.2.1 - Provide outreach and education to employers and the employees on the hazards they could be exposed to and proven strategies / interventions for exposure control.

Action Step 5.2.2 - Conduct research on facility and equipment design and other engineering modifications that can reduce employee exposure to respiratory disease causing agents.

Action Step 5.2.3 - Conduct continued research on chronic respiratory disease and its effects on agricultural workers, giving attention to both occupational and non-occupational risk factors and how they combine.

Action Step 5.2.4 - Develop and improve methods for assessment of exposures and better characterization of pathophysiological disorders.

Action Step 5.2.5 - Conduct research on how to best develop respiratory protection programs for rural communities and on best practices for providers of these programs and services.

Action Step 5.2.6 - Improve utilization of the NIOSH Agricultural Centers to address regional work and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research, outreach and education.

Intermediate Goal 5.3 - Reduce acute and chronic illnesses associated with exposure to pesticides and other agrochemicals.

Pesticides are a diverse group of chemicals in terms of their toxicity, modes of action, and uses. Broadly, pesticides include insecticides, herbicides, fungicides, fumigants, and specialty applications such as miticides, algaecides, and rodenticides. The pesticide landscape is steadily changing as chemicals move off the market while others move on. For many decades,

pesticides have been an integral part of crop and animal production. They have also been used in forestry to control insects and diseases, and have emerged in commercial fish farming. Workers in the Agriculture, Forestry, and Fishing (AFF) sector are also exposed to other agrochemicals, such as biopesticides, fertilizers, organic crop protection chemicals, crop oils, adjuvants, as well as inert ingredients in pesticide formulations.

Historically, the effects of acute pesticide exposure were initially described, especially the effects from acute exposure to organophosphorus (OP) and carbamate acetylcholinesterase-inhibiting pesticides. More recently, the effects of chronic pesticide exposure, as well as the delayed effects of acute pesticide exposure, are becoming better understood. Chronic exposure to certain pesticides has been associated in epidemiological studies with certain cancers (e.g. non-Hodgkin's lymphoma, prostate, colon, bladder, multiple myeloma, and leukemia), with respiratory disease (allergic asthma) and respiratory symptoms (e.g. wheeze), with certain neurological-related conditions and disorders (e.g. Parkinson's, depression, cognitive dysfunction, and organophosphate-induced delayed neurotoxicity), with retinal degeneration, and with hearing loss. On-going or additional research is needed to confirm these associations and to understand the biological mechanisms of action utilizing appropriate in vitro human systems, human cell lines, human primary cells, and humanized transgenic animal models. Human metabolism studies, using genotyped samples with polymporphisms, can also reveal the extent of variation within the population, thereby improving human health risk assessment Certain pesticides have also shown reproductive or developmental effects in animals; however, human data are limited. Less understood is the effect of co-exposure to multiple pesticides which may dramatically alter the metabolism and elimination of pesticides and enhance toxicity. Interactions between pesticides and endogenous metabolites such as steroid hormones may have important human health implications.

Exposure monitoring, pesticide poisoning surveillance, and epidemiological studies have been used to varying degrees to describe the extent of pesticide exposure, morbidity, and mortality among AFF workers. AFF workers exposed to pesticides include farmers, ranchers, commercial pesticide applicators, horticultural workers, tree nursery workers, forestry workers, hired agricultural workers, crop advisors, and commercial fish farmers. The families (spouses and children) of AFF workers may also be exposed to pesticides either as a result of the close proximity of the home and work environment or through pesticides carried home on the clothes and equipment of the workers. Methods to assess pesticide exposure include environmental measurement of pesticides in air and dermal samples, qualitative and quantitative fluorescent tracer techniques, and biological monitoring. These techniques have generally required significant laboratory facilities. More rapid, but still reliable, in-field assays would be desirable. The

wide-ranging chemistry of pesticides and their metabolites together with the continual introduction of new pesticides poses a challenge for developing exposure monitoring tools.

As exposure and health studies identify determinants of pesticide exposure and exposure pathways among AFF populations, research to evaluate interventions for reducing exposure will be needed. These interventions might focus on equipment modifications, work practice changes, personal protective equipment use, hygiene practices, culturally- and language appropriate training and education materials, and risk perceptions.

Action Step 5.3.1 - Develop / implement and evaluate cholinesterase testing guidelines / rules.

Action Step 5.3.2 - Develop / distribute pesticide education materials that can be easily understood by all workers, including foreign-born workers, reflecting language and cultural differences.

Action Step 5.3.3 - Test and evaluate interventions that lead to implementation of best practices and behavioral change.

Action Step 5.3.4 - Develop and improve methods for assessment of exposures to agrochemicals, including interactions of multiple chemicals found in the workplace.

Action Step 5.3.5 - Improve utilization of the NIOSH Agricultural Centers to address regional work and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research, outreach and education.

Intermediate Goal 5.4 - Reduce illness and disease due to environmental and infectious exposures in agriculture such as ultraviolet radiation, heat and cold, noise and zoonoses.

The agricultural worker encounters many environmental health risks attributable to a diverse agricultural workplace. Included among these are exposures to physical agents such as hot or cold work environments. The hours of outdoor work common in many agricultural settings often result in intense exposures to ultraviolet (UV) radiation and dermatologic health outcomes such as skin cancer. Exposures to noise and vibration are a common occurrence in agriculture through exposure to a range of farm machinery and animal confinement operations. Studies document that noise induced hearing loss can accompany these exposures in farmers. Agricultural tasks often involve close work with many different types of domestic animals providing opportunity for the expression

of zoonotic diseases through contact with diseased animals, their body fluids, aerosols from contaminated agricultural settings, or from needle stick injuries. Brucellosis, leptospirosis, tuberculosis and avian or swine influenza are some examples of zoonotic diseases and exposure hazards among agricultural workers.

The health status, illness and disease, of workers on American farms from environmental exposures are difficult to quantitate for several reasons. First, farm workers are exposed to an almost infinite array of environmental hazards, chemical exposures, biological agents, and physical agents (noise, heat, cold, vibration, UV light, etc.). Farm workers undertake almost any work situation due to the variety of tasks to be performed, traditional crop and livestock production, but many other things that come up such as machinery repair, welding, and pesticide applications or other incidental chemical exposures. They perform almost any task that can be found in industrial operations and manufacturing. The Bureau of Labor Statistics provides statistics on agricultural injury and fatalities, but this is only half the story. Occupational illness is common in agriculture, however, documenting exposure and health effect is difficult because of the long latency period (years) between exposure and health outcome. Also these occupational diseases mimic other chronic diseases of life, such as cancer, liver disease, etc. NIOSH and most occupational health professionals have concluded occupational disease in agriculture has a high incidence and prevalence. Better disease surveillance is needed to determine reduction of these diseases; however the limited amount of data available from the BLS and NIOSH should provide a basis for determining a reduction of occupational disease and associated fatalities over time. Thus we must establish a goal for occupational disease reduction and analyze outcomes with the tools available.

Action Step 5.4.1 - Research animal related diseases or zoonosis, such as but not limited to avian influenza, bovine tuberculosis and other emerging issues. Exposure assessment, prevention, vaccination and treatment all need to be covered in the research.

Action Step 5.4.2 - Test and evaluate interventions that lead to implementation of best practices and behavioral change.

Action Step 5.4.3 - Develop methods of exposure evaluation as well as ongoing research into the characterization of pathophysiology of these illnesses.

Action Step 5.4.4 - Improve utilization of the NIOSH Agricultural Centers to address regional work and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research, outreach and education.

Intermediate Goal 5.5 - Develop and promote adoption of effective interventions to enhance psychological well-being of workers and to minimize the adverse effects of stressful agricultural working conditions (e.g., economic forces, weather, and isolation).

Psychological stress is typically a product of overwork or conflicting or competing demands on the job. Inadequate time to complete a task can create anxiety and stress that then challenge the ability of workers to cope with the job demands. As this high level of demand continues over many hours or days, fatigue accumulates along with the stress and farmers and farm workers are no longer able to attend to the hazardous conditions in their work environments. The cumulative impact of psychological stressors can lead to conditions of acute stress in the short-term and chronic strain over the long term. Changing weather conditions provide an excellent example where the agricultural worker has no control over the forces of nature but is nevertheless responsible for maintaining the agricultural operations.

The experience of the U.S. farm crisis of the 1980's has been replicated around the world. An economic recession in the U.S. which followed a period of high inflation resulted in some farmers owing more money than their entire operations were now worth. In the language of agricultural economics, the debt-to-asset ratio on some U.S. farms rose above 1.0. One consequence of this crisis is that the suicide rate (from confirmed suicides) of principal owner/operators of farms climbed to approximately four times that of other rural residents, including other farm family members. (The actual rate of suicides among principal owner/operators in the U.S. is almost certainly much higher because of the stigma associated with suicide, as well as possible loss of any insurance benefits.) The continuing stress and worry associated with these economic problems resulted in the loss of many family farms, marital breakups, and as noted, too may suicides.

To summarize, the combination of stress and fatigue has both short and long-term consequences. In the short term, stress and fatigue can result in lack of attention to changing hazards that can lead to poor decision-making by the farmer or farm worker. In the long term, prolonged stress can lead to chronic strain, depression, and even to suicide.

Action Step 5.5.1 - Develop a surveillance system to help qualify the types and extent of psychological disorders experienced by agricultural workers. Use those findings to develop research priorities.

Action Step 5.5.2 - Conduct more research on these issues as they relate to specific regional concerns or patterns.

Action Step 5.5.3 - Develop, implement and evaluate culturally appropriate educational and outreach programs for promoting psychological well-being of agricultural producers, farms workers and their families. Involve agricultural workers in their development and delivery.

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STRATEGIC GOAL 6 – Forestry Safety

6. Strategic Goal: Reduce the number, rate and severity of traumatic injuries and deaths involving hazards of forestry.

What are the numbers?

The numbers in the forestry workforce depend on who does the accounting and for what reason. The numbers depend also on the state and how important forestry is to that economy or the state agency making the count. National counts are not well represented by aggregating state numbers or Census data. For example, until 2001 (2003 in practice) logging was in Standard Industrial Classification (SIC) code 241 and forestry tracts and services in SIC in 2008. The current North American Industrial Classification Standard (NAICS) moved the forestry workforce in part into the Natural Resources sector grouping of Agriculture, Forestry and Fishing. Previously, logging was associated with milling forest products and partially covered by the Census of Manufacturing periodically. It is unclear which agency is responsible for the forestry workforce. The Census of Agriculture covers farms and farmers and reports on forestry products but not people.

Reporting of deaths, injuries/accidents and illnesses related to forest work seems to work with some exceptions for long term damage/illnesses. However, establishing the true causes of accidents is often not possible because of the way data are collected or investigations conducted. In states where good data exist on logging and forestry services, rates of fatalities, disabling claim, occupations, exposure events, nature of injuries, body, and source of injury provide the basis for interventions and tracking of progress trends (Information Management Division, Oregon Department of Consumer & Business Services, October 2007).

See Appendix 1. The Forestry Workforce, Statistics and Organizations for more information.

Intermediate Goal 6.1 - Reduce logging-related deaths and traumatic injuries by 50% by 2018, through research-based safety improvements.

Action Step 6.1.1 - Assess data collection of forestry sector workforce participation by category (logging, forestry services, etc) and associated illness/injury collection. Target: 2011

Action Step 6.1.2 - Assess Census of Agriculture for forestry sector uses. Target: 2010 Look for new surveillance approaches, look at all models, e.g., New Zealand, others. Target: 2011.

Action Step 6.1.3 - Assess the adequacy of fatality and injury reporting by type of logging. Target: 2012.

For example, manual vs. mechanized logging, worker job category, full-time employees vs. part-time workers, etc.

Action Step 6.1.4 - Search data and literature for possible improvements or seek to measure success of interventions and summarize data for forestry sector partnerships. Target: 2013.

For example, literature and organizational review of national and international forestry improvements that can be shared with NIOSH forestry partners (Swiss: Safety and Health are Feasible in Forestry).

Action Step 6.1.5 - Determine what special studies might be needed to collect desired information. Target: 2013.

Action Step 6.1.6 - Implement trials for improved data collection and review potentials for improvements. Target: 2015.

Action Step 6.1.7 - Determine the impact of solitary work conditions and remote locations on fatality rate in order to design effective counter measures (more specific first-aid training, better communication devices, location/navigation aids for first responders). Target: 2013.

Intermediate Goal 6.2 - Assess current federal and state forestry safety codes (e.g., OSHA, Federal Forest Activities, and state laws) for their coverage and provide guidance for their updates to maximize adoption of practices that minimize logging and forestry hazards.

Action Step 6.2.1 - Review 1994 OSHA logging standards at Federal level for currency and adequacy using industry, state agency, cooperative review. Target: 2012.

For example, AgFF researchers could collaborate with OSHA and a National Logging Committee composed of experts, state OSHA agencies, etc. to review the standards.

Action Step 6.2.2 - Review currency of state logging codes, plans for updating and processes used within 3 years. Target: 2013.

For example, AgFF researchers could help organize Regional OSHA offices, state OSHA agencies and industries to stimulate updating current state logging.

Action Step 6.2.3 - Review Federal Safety Standards for coverage of forestry services activities and report within 2 years. Target: 2012.

Action Step 6.2.4 - Assist states in code revisions with research results and methodologies and model standards/approaches Target: 2013.

Action Step 6.2.5 - Provide recommendations for a revised Federal OSHA Code for Logging. Target: 2015

Action Step 6.2.6 - Prepare model standard for forestry services at Federal level. Target: 2014.

Action Step 6.2.7 - Provide a draft Federal OSHA Code for forestry services. Target: 2016

Intermediate Goal 6.3 - Identify factors (e.g., risk-taking behaviors, workers compensation vs. self-insurance) that limit the adoption of safe logging practices and the treatment of logging-related injuries and propose interventions to address these factors.

Establishing cause and effect for forestry accidents can be difficult. Some accident investigations by state and federal organizations are not able to show specifics on cause. Comprehensive accident investigations by competent forestry specialists with knowledge of equipment, conditions, and procedures would be helpful. The population of seriously disabled forestry workers might provide essential information on the actual cause of the injury after legal issues are resolved, workers' compensation issues settled, and disabled workers are providing information anonymously. There is a need to better understand risk-taking behaviors of forestry workers.

Action Step 6.3.1 - Assess populations of seriously disabled forestry workers for legal and ethical issues of interviews that are anonymous and detailed regarding the circumstances of their injury. Target: 2010.

Action Step 6.3.2 - Conduct trial regional studies (interviews) with knowledgeable forestry interviewers with seriously disabled workers to assess circumstances of their injury. Target: 2012.

Action Step 6.3.3 - Implement larger study of seriously disabled forestry workers and contrast results with data collected at the time of injury. Target: 2013.

Action Step 6.3.4 - Develop models of risk taking behaviors with testable hypotheses and assess models with research and data. Target: 2014.

Action Step 6.3.5 - Develop interventions and testable approaches for reducing risk-taking behaviors and implement appropriate trials. Target: 2016.

Intermediate Goal 6.4 - Establish a Forestry Sector Partnership to outline research methodologies and to develop new technologies (e.g., synthetic rope, "smart" clothing) to reduce workloads and injury risks associated with logging and forest operations.

Action Step 6.4.1 - Establish partnerships between the forestry sector and NIOSH researchers and cooperators to reduce workloads in the sector. Target: 2009.

For example, NIOSH or the AgFF Council could support and participate in a "Future of the Forestry Workforce Conference" with sector leaders to establish working relationships with forestry researchers and Extension Forestry faculty to disseminate results.

Action Step 6.4.2 - Establish a working group for future occupational safety and health research in the forestry sub-sector. Target: 2010.

Action Step 6.4.3 - Establish a mechanism of supporting research capacity of forestry sector research partners for graduate students from the forestry sector to conduct safety and health research in cooperation with NIOSH. Target: 2010.

Action Step 6.4.4 - Produce a Forestry Safety and Health web-based curriculum with materials adapted for U.S. Regions that introduces undergraduate forestry students to safety and health concepts. Build support and connections to future forestry sector leaders. Request government funding with a university taking lead for development and production of the curriculum. Target: 2009.

Action Step 6.4.5 - Conduct trials with technologies (low-hanging fruit) like synthetic rope to replace wire rope in logging and trucking to document workload reductions and establish research methodologies. Target: 2011.

Action Step 6.4.6 - Review use of powered hand tools for use in steep terrain to build fire trails and assess use of modified logging equipment to fight wildland fires for safety and health improvements. Target: 2013.

For example, NIOSH could work with the U.S. Forest Service Equipment Development Centers to reduce workloads in wildland firefighting.

Action Step 6.4.7 - Review technologies that reduce workloads, e.g., radio-controlled chokers, robotic functions, and autonomous systems for harvesting and conduct trials for documenting gains. Target: 2012.

STRATEGIC GOAL 7 – Forestry Health

7. Strategic Goal: Improve the health and well-being of forestry workers by reducing occupational causes or contributing factors to acute and chronic illness and disease.

Forestry workers face health risks related to the arduous jobs they perform in inclement weather for long work shifts. Resulting musculoskeletal diseases and illnesses are present in workers and they shorten working lives. Exposures to hazards and toxic materials require protective clothing and equipment. Drug use is reported among workers. The health status of workers is not known but has likely changed with mechanization.

Intermediate Goal 7.1 - Develop and implement interventions to minimize the frequency and causes of work-related musculoskeletal diseases (MSDs) and other acute and chronic illnesses leading to premature disability.

Action Step 7.1.1 - Assess tree planting operations for possible mechanization and means to reduce workloads, e.g., delivering trees to planters in steep terrain. Target: 2010.

Action Step 7.1.2 - Compare mechanized harvesting operations versus manual systems for health effects. Target: 2011.

Action Step 7.1.3 - Review technologies that reduce workloads, e.g., radio-controlled chokers, robotic functions, and autonomous systems for harvesting to reduce MSDs, other health effects. Target: 2013.

For example, research documentation is needed to show how efforts to reduce workloads result in fewer diseases and illnesses with the long term goal of maintaining the working lives of people.

Intermediate Goal 7.2 - Improve the quality and availability of protective equipment (Personal Protective Equipment (PPE) and Equipment Protection) suitable for the forestry working environment and facilitate the adoption of its use within the forestry sector.

Several of the developments below could come from research partnerships with Forestry researchers within Universities, U.S. Forest Service research units, and NIOSH research units. Research issues include performance related to age, temperature extremes, response to cleaning materials and solvents, and hazards of thrown objects.

Action Step 7.2.1 - Assign NIOSH and forestry sector team to continue and monitor developments in this research area, NIOSH-NPPTL lab. Target: 2009.

Action Step 7.2.2 - Assess potentials of "smart clothing" in other sectors, e.g., sports, military, etc. for use in logging and forestry services to provide feedback and data on workers during operations and worker status on tasks. Target: 2010.

Action Step 7.2.3 - Implement trials of "smart clothing" in forestry sector to collect workload data, e.g., heart rate, etc and worker status, e.g., heat stress. Target: 2010-2015.

Action Step 7.2.4 - Implement trials of NIOSH respirator for use in wildland firefighting and assess exposure to smoke for wildland firefighters. NIOSH-NPPTL & USFS Missoula Equipment Development Center. Target: 2011.

Action Step 7.2.5 - Review safety hard hat for improvements, e.g., protection during falls for head and neck, during hot weather conditions. Target: 2012.

Action Step 7.2.6 - Develop eye protection that is effective in both sun and rain conditions. Target: 2011.

Action Step 7.2.7 - Develop hand chemical application PPE that is effective in forestry environment Target: 2012.

Action Step 7.2.8 - Review glazing materials for their performance and specifications as a means to protect machine operators from hazards. Target: 2012

Intermediate Goal 7.3 - Evaluate the frequency of, impact of, and possible interventions for, the use of illicit prescription and other drug use by forestry workers, especially as it pertains to transportation of workers and products.

Action Step 7.3.1 - Assess current data sets on forestry worker injuries and fatalities for drug involvement to see if recordkeeping provides basis for assessment. Target: 2010.

Action Step 7.3.2 - Modify recordkeeping procedures consistent with legal and ethical guidelines to provide data for future assessments. Target: 2012.

Action Step 7.3.3 - In states where "medical use" of Cannabis is allowed, assess the extent of legal and illegal use by forestry workers. Provide assessments of other drug use on the job, e.g., methamphetamines, etc. Target: 2013.

Action Step 7.3.4 - Assess current methodologies and improve them for field testing of employees for drug impairment for use by employers. Target: 2014.

Action Step 7.3.5 - Develop strategies for eliminating "perceived" need for drug use on the job, e.g., wake/rest cycles, alert warning devices, workload reduction, rest/refreshment breaks, etc. Target: 2010-2015.

Intermediate Goal 7.4 - Assess the health conditions of forestry workers to improve work design and work practices for workers entering the sector and at career stages of working life.

Action Step 7.4.1 - Conduct preliminary health screening of workers entering the workforce for mechanized logging, manual logging, tree planting, wildland firefighting, etc. Target: 2011.

Action Step 7.4.2 - Conduct expanded health screening of workers entering workforce by age, occupation, pre-existing conditions, etc. Target: 2012.

Action Step 7.4.3 - Assess health conditions of workers and work demands at selected career points and by occupation in logging, forestry services, etc. Target: 2014.

Action Step 7.4.4 - Assess health conditions of workers over age 45 in forestry for health conditions that will affect continuing in the same occupation or will need review for work modifications in their future.

Action Step 7.4.5 - Assess design improvements to work arrangements to address worker health conditions by occupation in logging, forestry services, etc. Target: 2015.

For example, health screenings may suggest worker pre-conditions for illness or disease that adjustments in work practices can help alleviate.

Action Step 7.4.6 - Assess interventions to worker health conditions related to work demands in logging, forestry, etc. Target: 2016.

STRATEGIC GOAL 8 – Fishing Safety

8. Strategic Goal: Reduce the number, rate and severity of traumatic injuries (including deaths) involving hazards of commercial fishing.

Commercial fishing remains one of the most hazardous occupations in America. Despite reductions in fatalities since passage of the Commercial Fishing Industry Vessel Safety Act of 1988, commercial fishermen remain over 25 times more likely to die pursuing their occupation than the average worker in America. According to Bureau of Labor Statistics for 2006 [U.S. Department of Labor, 2007] the fatality rate for commercial fishing sector was 141.7 per 100,000 workers. This compares to the national average of 3.9 per 100,000 workers making commercial fishing the most dangerous occupation in America. From 1994-2004, 641 commercial fishermen died in the United States, an average of 58 each year. During this same time period, an average of 127 vessels were lost each year. These lost-vessel events resulted in 332 fatalities. Another 184 (29%) fatalities were due to falls overboard. The remainder of the fatalities were due to deck injuries (51, 8%), diving (31, 5%), fires or explosions (31, 5%), and other causes (12, 2%) [Dickey 2007].

The impact of the high rate of death and injury is devastating to fishing communities and fishermen's families. The independent culture of those within the industry and the limited safety and health regulations combine to create an environment where high risk practices are accepted as part of the job. Working conditions on board fishing vessels include a working platform exposed to the elements of weather in some extremely harsh conditions and which is continually in motion, most frequently wet, and reliant upon heavy machinery. Fishermen endure these conditions for extended periods of time adding fatigue as a significant safety issue. To exacerbate this situation, some of the industry is overcapitalized and competition for a tightly controlled resource adds competitive pressure to support risk taking.

We have outlined the Strategic goals focusing on the commercial fishing industry to address the highest safety and health priorities.

According to an analysis by the U.S. Coast Guard [U.S. Coast Guard 2004] 51% of fatalities in the commercial fishing industry are attributed to flooding, sinking, or capsizing of the vessel. Another 29% of the fatalities were falls overboard. With three-quarters of all fatalities, water exposure is by far the most significant factor in personnel loss. Current safety regulations are focused on mitigating adverse events rather than preventing them, for example, keeping fishermen warm and afloat as they wait for rescue.

Injury solutions have focused on education and other outreach efforts. Some notable examples of the positive impact of ensuring compliance with existing

regulations and aggressive education have resulted in notable improvements in fatality rates such as the pre-season boarding program in Western Alaska [Lincoln 2007]. The Intermediate goals 8.1 and 8.2 address the most significant causes of fatalities.

Intermediate Goal 8.1 - Reduce the vessel sinking and fatality rate due to vessel sinking by 50% by 2018.

Action Step 8.1.1 - Identify the fishery specific hazards across the country for vessel sinking and subsequent fatalities. Apply risk management techniques. Target: 2009.

Action Step 8.1.2 - Develop tailored interventions for the highest risk fisheries to reduce injury and fatality rates by half such as the pre-season safety checks similar to the ones conducted in Western Alaska. Target: 2010.

Action Step 8.1.3 - Evaluate if safety training reduces the fatality rate of commercial fishermen involved in vessel sinking. Target: 2010.

Action Step 8.1.4 - Evaluate the effects that fisheries management practices have on safety in 6 different fisheries in the United States. Target: 2010.

Action Step 8.1.5 - Develop a Top 10 list of fisheries management practices that contribute to unsafe practices in the commercial fishing industry. Target: 2011.

Action Step 8.1.6 - Determine the cost effectiveness and benefits of safety training in reducing the rate of serious injuries, including fatality rates. Target: 2013.

Action Step 8.1.7 - The Coast Guard, working with NIOSH, will determine the benefits of self inspection of fishing vessels in reducing maintenance related vessel sinking. Target: 2014.

Action Step 8.1.8 - Determine factors affecting the risk taking behaviors of fishermen that lead to vessel sinking. Target: 2014.

Action Step 8.1.9 - The Coast Guard will determine the benefits of stability training in reducing vessel capsizing and sinking. Target: 2015.

The Coast Guard, at the recommendation of the Commercial Fishing Industry Vessel Safety Advisory Committee, will propose regulations for mandatory stability training for masters and owners of documented commercial fishing industry vessels. Documented vessels are those vessel required by federal regulations to register with the Coast Guard because of vessel size (generally over 40 feet in length) and so consequently operate further from shore and in more extreme environmental conditions. The Commercial Fishing Vessel Safety Act of 1988 specified different

requirements for documented vessels. Similar requirements have recently been adopted by the Workers Compensation Board of British Columbia.

Intermediate Goal 8.2 - Reduce fatal falls overboard events and rates by 50% by 2018.

Action Step 8.2.1 - NIOSH and the Coast Guard in conjunction with the Commercial Fishing Industry Vessel Safety Advisory Committee will develop and evaluate best practices for preventing falls overboard. Target: 2010.

Action Step 8.2.2 - NIOSH and the Coast Guard in conjunction with the Commercial Fishing Industry Vessel Safety Advisory Committee will publicize best practices and recommendations for preventing falls overboard. Target: 2012.

Action Step 8.2.3 - NIOSH and the Coast Guard in conjunction with the Commercial Fishing Industry Vessel Safety Advisory Committee will develop and evaluate best practices for reducing fatalities from falls overboard. These would include activities such as field evaluations of PFDs, surveys of fishermen, developing better recovery devices and practices. Target: 2010.

Action Step 8.2.4 - NIOSH and the Coast Guard in conjunction with the Commercial Fishing Industry Vessel Safety Advisory Committee will publicize best practices for reducing fatalities from falls overboard. Target: 2012.

Intermediate Goal 8.3 - Understand and reduce the number, rate, and severity of hospitalized injuries rates by 50% by 2018.

Injuries on commercial fishing vessels are required by regulations to be reported to the U.S. Coast Guard. While the Coast Guard is confident in data related to fatal injuries, it does not believe that most injuries are reported. NIOSH has begun to collect data from other agencies, including state trauma registries. Obtaining adequate and consistent injury data will remain a challenge. Determining rates will be similarly challenging as there is no hard source of employment data.

Action Step 8.3.1 - By 2010, identify data sources to analyze to identify high risk operations leading to serious injuries by fishery (See 1.2.6 Commercial Fishing Injury Database and 1.3.5). Target: 2010.

Action Step 8.3.2 - Develop regional or fishery specific interventions to address highest risk operations for hospitalized injuries. Target: 2011.

Action Step 8.3.3 - Complete fisheries specific outreach plan to share best practices for high risk operations (see 3.3.2 for best methods of communication). Target: 2016.

Intermediate Goal 8.4 - Make commercial fishing vessel safety an interagency effort/priority.

Safety regulations, training, and equipment are not the only factors affecting health and safety within the commercial fishing industry. Federal authority to engage in commercial fishing is controlled by nine Fisheries Management Councils (FMCs) and the National Marine Fisheries Service (NMFS). FMCs develop proposed regulations specifying equipment, areas of operation, restrictions, timing, and other details of fisheries openings. Some decisions can have the unintended consequence of increasing risk. For instance, a recent requirement did not recognize that a vessel returning to port because of weather penalized the owner because the trip counted against the limited fishing days although no fishing activity was undertaken. Other regulations are based on hypothesized improvements in safety such as individual quotas. Understanding if these types of management decisions improve safety should be documented.

Intermediate goal 8.4 addresses this secondary contributing factor to casualties; fisheries management decisions that may unintentionally require unnecessary risk taking, penalize operators for safety related decisions, or otherwise place a higher priority on fisheries issues at the sake of safety concerns. This is especially germane as fisheries management decisions place additional restrictions on commercial fishing to the point that many fisheries cannot support the number of operators permitted in those fisheries. This recommendation stems from a study of fishing vessel safety sponsored by the U.S. Coast Guard in 1999 [U.S. Coast Guard 1999].

Action Step 8.4.1 - Develop a Memorandum of Agreement among NIOSH, NMFS, OSHA, and the Coast Guard on cooperation in improving commercial fishing safety. Target: 2010.

Action Step 8.4.2 - Form a National Fisheries Management and Safety Coordination Committee to coordinate national policy integrating fishery management and safety regimes. Target: 2011.

Action Step 8.4.3 - Through the National Fisheries Management and Safety Coordination Committee, develop methodologies to address overcapitalization, human resource issues with fisheries plans, and economic pressures within the commercial industry as these issues relate to safety within the industry. Target: 2012.

References

Lincoln JM and Conway GA [2007]. Preventing commercial fishing deaths in Alaska. Occupational and Environmental Medicine, Vol 56 (10): 691-695.

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U.S. Coast Guard [2004]. Analysis of Fishing Vessel Casualties - A Review of Lost Fishing Vessels and Crew Fatalities, 1994 – 2004, http://www.uscg.mil/hq/g-m/moa/docs/fvstudy9404.pdf)

STRATEGIC GOAL 9 – Fishing Health

9. Strategic Goal: To improve the health of commercial fishermen by reducing occupational causes or contributing factors to illness and disease.

Commercial fishing workers face an exceptionally wide range of acute and chronic health exposures at work. However, little research has been completed in regard to these health issues or the prevention of them. Commercial fishing is hard physical labor that involves long hours under difficult conditions and repetitive exposure to musculoskeletal strains and sprains, physical factors such as noise, psychological stresses and toxic chemicals.

There is also no surveillance system or reporting requirement for health hazards present in the commercial fishing industry. The data collection challenge remains a problem and is addressed throughout this document. The three intermediate goals which follow are not meant to be all inclusive but represent decisions of the council regarding priority attention.

Intermediate Goal 9.1 - Measure and reduce work-related musculoskeletal disease due to acute and chronic exposures and ergonomic factors.

Action Step 9.1.1 - Conduct continued research on MSD risk factors as they relate to commercial fishing workers.

Action Step 9.1.2 - Conduct research on alternative methods to accomplish tasks with high incident rates of MSD.

Action Step 9.1.3 - Develop best practice models for MSD prevention in specific fishing operations.

Action Step 9.1.4 - Conduct research on MSD injury recovery and return to work in a commercial fishing setting that provides guidelines to health care providers, injured workers and employers.

Action Step 9.1.5 - Develop / distribute guidelines for prevention of musculoskeletal injuries specific to the commercial fishing sub sector.

Action Step 9.1.6 - Continue research into and development and validation of MSD exposure assessment tools as well as the etiology of MSD's.

Intermediate Goal 9.2 - Measure and reduce illnesses and disease due to exposures to physical factors such as noise, cold, heat, and ultraviolet radiation.

Action Step 9.2.1 - Conduct continued research on exposures to physical factors such as noise, cold, heat, and ultraviolet radiation.

Action Step 9.2.2 - Test and evaluate interventions that lead to implementation of best practices and behavioral change.

Intermediate Goal 9.3 - Measure and reduce acute and chronic illnesses due to exposures (such as marine organisms, chemicals, particulate matter).

Action Step 9.3.1 - Develop/implement and evaluate testing guidelines / rules for marine organism, shipboard chemicals used in commercial fishing and processing, and particulate matter.

Action Step 9.3.2 - Develop/distribute educational materials that can be easily understood by all workers, including foreign-born workers, reflecting language and cultural differences that addresses the hazards of marine organisms, chemicals, and particulate matter used in the commercial fishing and processing industries.

Action Step 9.3.3 - Test and evaluate interventions that lead to implementation of best practices and behavioral change.

Action Step 9.3.4 - Develop and improve methods for assessment of exposures to marine organisms, chemicals, and particulate matter found in the workplace.

APPENDIX 1: The Forestry Workforce, Statistics, and Organizations

Taken broadly, the forestry workforce is the sum of those people who bring forest resources to a market or who provide services to the forest. The forest is considered to be public or private forest lands exclusive of municipal parks and urban forests. From a safety and health view, timber harvesters (loggers) have received the most attention because of the high hazards and injury/fatality rates. Those who provide caretaking services like planting, fire protection or vegetation control are part of the forestry services sector. Forest land managers (who are not owners themselves) may be counted among the forestry services numbers. Others in the forestry workforce include those who harvest non-wood forest products like greenery, mushrooms, etc. Those who transport forest products from the forest like log truck drivers and those who build/maintain forest roads are part of the workforce as well. U.S. Non-Industrial Forest Landowners total nearly 10 million in number. Forestry is in reality a sub-culture. There are commonalities in language, clothing, work practices, viewpoints, and so forth.

There are important regional forestry differences and therefore, in the forestry workforce, e.g., logging workers. Distinct differences are found in the Northeast, South, Midwest, and Western logging practices and workers. Ethnic differences somewhat follow regions with Black participation in the South and American Indian and Latino participation in the West. Educational attainment and wage levels vary by region as well.

Forestry services workers are predominantly Latino while greenery and mushroom harvesters are often immigrants from Southeast Asia. Localized forestry crews may even be “Russian” immigrants. Gathering of herbs (e.g., ginseng and goldenseal) for sale is done by rural people throughout the eastern US, especially Appalachia. Fire fighters mainly come from Indian tribes and the Latino population.

The table below summarizes some details of the forestry workforce from government sources and the estimates prepared for this document by Dr. John Garland.

National Statistics	Sources		
Worker Categories:	**BLS***	**Census***	**Dr. Garland's Estimates***
Logging	68	83.4 (1997) 69 (2004 CBP)	100+
Forestry Services	12	5 (2004 CBP) 26.5 (1997 CBP)	25
Support Services	? % of 103	?% of 97.5	5
Fatal rate calculation	88.7	NI	NI
Truckers/transport	NI	NI	18
Self Employed	NI	NI	10
Seasonal workers	NI	NI	10+
Non-wood harvesters	NI	2 (2004 CBP)	8
Forestry Professionals	NI	NI	17
Forest Landowners	NI	NI	9900
Logging Firms	NI	13.6 (1997) 11 (2004)	25
Total Workers (excluding owners & foresters)	**92**	**76**	**176**

* Numbers listed in thousands

BLS = Bureau of Labor Statistics
CBP = county business patterns data
NI = not included
Dr. Garland's estimates subject to further research and documentation

In a recent NAS-NIOSH review of the AgFF sectors, the Current Population Survey estimates some 202,000 workers in logging and forestry at risk (NAS draft review, p. 20. BLS 2007 data).

The Forestry workforce is larger and more varied than typically described or reported. No single agency tracks the forestry workforce while some agencies focus on portions of the logging workforce due to high accident rates. In order to make improvements to safety and health of workers, researchers must know the forest operations themselves and the nature of the workforce segments under study. There is a shortage of PhD level forest operations researchers and an even greater void for safety and health researchers. Organizations in the forestry sector are limited in interest to a segment of the forestry workforce or to a region. No national organization speaks for the entire forestry sector even though the dismal safety and health statistics cry out loudly for effective action.

Forestry Fatalities, Injuries and Illnesses

Logging fatalities often place that industry group in the top three most dangerous jobs based on fatality rates, e.g., 95 fatalities for 111 thousand employees gives a rate of 85.6/100,000 in 2006

(http://www.bls.gov/iif/oshwc/cfoi/CFOI_Rates_2006.pdf accessed on Feb. 8, 2008). This rate was only exceeded by the sector grouping of fishing, hunting and trapping at 95.9. Forestry services are imbedded in the sector grouping of support activities for agriculture and forestry at 26.1 fatalities per 100,000 workers.

Logging injury rates for 2006 nationwide were 5.6 recordable cases per 100 fulltime workers compared to 4.4 for all private industry. Support activities for forestry were the same as all private industry (http://www.bls.gov/iif/oshwc/osh/os/ostb1765.pdf accessed on Feb. 8, 2008)

The NAS-NIOSH report makes the conclusive statement on forestry occupational illnesses:

"The prevalence of occupational diseases is unknown" (NAS-NIOSH AgFF Report, p. 21)

Because of the difficult and arduous physical nature of many jobs in the forestry sector, shortened working lives can be expected due to cumulative trauma to joints and other work-related musculoskeletal diseases. For some forestry workers, exposures to pesticides offer health risks as well. All workers exposed to weather conditions of heat and cold could suffer heat stress/stroke and frostbite in the workplace. Irritating plants also pose nuisance health risks. Sedentary and repetitive work postures for machine operators also may lead to health risks. Heavy work loads may implicate fatigue in accidents,

It should be made clear that fatality, injury and health risks vary by the type of forestry activity involved, e.g., manual tree felling, tree planting on steep slopes, etc. and the region of the U.S. where the activity takes place, e.g., cable logging on steep slopes in the West versus mechanized operations in the South).

Forestry Services Workers

Forestry services workers (NAICS 11531 & old SIC 0851) are those who provide work to forestry organizations that may not yield commercial logs, pulpwood, chips, or other tree materials destined to mills or energy plants. For example, such work includes tree planting, pre-commercial thinning, site preparation, fertilization, fuel reduction activities, wildlife habitat modification, wildland firefighting and collecting plant materials from the forest for various purposes as food, floral, medicinal or other uses. At times, the saws, cutting tools, machines, and working environment are exactly the same as those used by logging operations (covered by federal safety codes 29CFR1910.266). However, forestry services workers may not be covered by the codes for such work depending on each state's coverage (they are covered in Oregon and some wildland firefighters may be federally employed).

Many forestry services workers are employed by “labor contractors” and thus, may have special regulations dealing with housing, transportation and worksite conditions, but there are no specific federal codes dealing with the hazards in the activities performed. There is some federal coverage in “general duty clauses” of federal regulations but states are highly variable in their coverage of forestry services and the associated enforcement of safety and health regulations. Reporting of fatalities, injuries and illnesses of forestry services workers is highly variable by state. Many forestry services workers are immigrants (with and without documents) and migrate to various areas across the U.S. following seasonal work in forestry or firefighting.

No Single Voice

There has not been a significant degree of cooperation between NIOSH and the forestry sector on safety and health research. One reason is that there is no single voice for forestry sector worker safety and health. Forestry interests are spread over a multiplicity of national and state organizations with none fully representing the worker safety and health interests. Logging associations, state forestry extension organizations, and others have been involved in logger education and training that involves some safety and health topics. Research on forestry safety and health has been conducted in various Universities, Forest Service Research Units, state OSHA agencies and NIOSH units, but there has never been a coordinated effort for funding such efforts. NIOSH could serve a coordinating function by establishing partnerships with key individuals in forestry organizations across the United States. In order for NIOSH to be seen as having the forestry sector as one of its areas of research interests, NIOSH will need to systematically reach out to individuals and organizations to build relationships that could be seen as mutually beneficial.

Cooperating Organizations

Sample forestry sector partnerships:

RESEARCH COOPERATORS:
Forest Engineering/Operations University Programs
- Oregon State University
- U. Washington
- U. California-Davis
- U. Idaho
- U. Montana
- Mississippi State University
- Auburn University
- U. Georgia

U. Wisconsin
Virginia Tech University
Louisiana State University
Clemson University
U. Maine
U. Minnesota
SUNY – Syracuse
USFS Southern Research Unit—Auburn
International Union of Forestry Research Organizations: Div 3, Forest Operations
International Labor Office; FORWORNET (international network of interested forestry workforce professionals)

OPERATIONAL COOPERATORS:
(examples by state to show connections)
American Loggers Council (state/regional affiliates) www.americanloggers.org
e.g.,:
Michigan Association of Timbermen
Professional Logging Contractors of Maine
Northeastern Loggers Association (NELA).
South Carolina Timber Producers Association
Louisiana Loggers Council, etc
Forest Resources Association
Pacific Northwest Chapter of the National Wildland Firefighting Association (PNW-NWSA)
Association of Wildland Firefighters
Society of American Foresters
State Labor and Industries Agencies
State Plan Occupational Safety and Health Agencies
State Workers' Compensation Boards/Agencies
USDA Cooperative Extension Service, Extension Forestry

Example states:

OREGON
Associated Oregon Loggers, Professional Reforestation Contractors Association, Forest Activities Code Advisory Committee (OR-OSHA), Div. Consumer & Business Affairs (Statistics), Workers Compensation Board, OR Dept. of Economic Development, Bureau of Labor and Industries

WISCONSIN
Great Lakes Timber Professionals Association, Forest Industry Safety Training Association, the WI Department of Workforce Development, WI Workers Compensation Rating Bureau, WI Office of the Insurance Commissioner, WI DNR Division of Forestry

APPENDIX 2: Dictionary of Terms for Agricultural, Forestry and Fishing Safety and Health Professionals

A

Abbreviated Injury Scale (AIS): An anatomical scoring system first introduced in 1969. Since this time it has been revised and updated against survival so that it now provides a reasonably accurate way of ranking the severity of injury. The latest incarnation of the AIS score is the 1990 revision. The AIS is monitored by a scaling committee of the Association for the Advancement of Automotive Medicine. Injuries are ranked on a scale of 1 to 6, with 1 being minor, 5 severe and 6 an unsurvivable injury.

AIS Score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

Accident: An unplanned or unintended event or series of events that may result in death, injury, loss of or damage to a system or service; cause environmental damage; or adversely affect an activity or function. [Note: Many public health and injury prevention professionals prefer alternate terms such as injury incident or unintentional injury].

Adolescents: Individuals from the age of 13 through 17 years.

Aft: Rear portion of vessel.

Age-appropriate Work: Work activities that are suitable based upon physical and cognitive capabilities deemed to be typical by age demarcations. Age-appropriate work standards are required for purposes of labor law enforcement.

Age Groups: Preferred presentation of research data involving age groups is by groups of 5 years (e.g., <5, 5-9, 10-14,….55-59, 60-64, 65-69, etc.). If age group data focuses on youth ages 10-19, preferred presentation is by groups of 2 years (e.g., 10-1112-13, 14-15…18-19). If two or more age groups are collapsed use the same delineations, e.g., 5-14, 55-69.

Agriculture: The industry that involves the production of crops and livestock (farming; production agriculture) plus agricultural services, forestry, fishing and hunting. See also North American Industry Classification System.

Agricultural Hazardous Occupations Orders (AgHO): Part of the U.S. Department of Labor's Fair Labor Standards Act (1938) as amended in 1968. The AgHO prohibit children under the age of 16 from being hired to perform specified hazardous jobs on the farm. An exemption is provided that allows 14 and 15 year olds to perform specified hazardous tasks if they have successfully passed training in safe tractor and/or safe tractor and machinery operation.

Agricultural Sector Hazard: An existing or potential condition on or off the agricultural sector work site, directly related to agricultural sector operations, that is associated with a high risk of physical or physiological harm.

Agricultural Sector Injury: Injury occurring on the agricultural sector work site directly related to agricultural sector operations, including injury to bystanders; or an injury occurring off agricultural sector property that involves agricultural sector work. See also Farm and Agricultural Injury Classification Code.
Agritourism: Includes any attraction where the general public is invited to a farm, ranch or agribusiness operation for the purpose of enjoyment, education or active involvement in farm activities.
Alaska Marine Safety Education Association (AMSEA): Non-profit agency which conducts marine safety instructor-training and produces educational materials and training to commercial fishermen nationally.
Alternative communication system: A system by voice, hand or media other than horn or whistle which provides a safe and reliable method of communication between crew members
Animal Feeding Operation (AFO): An animal feeding operation is defined by the United States Environmental Protection Agency as a lot or facility where animals are kept 45 days of the year or more *and* structures or animal traffic prevents vegetative growth.
Approved container: A metal or polyethylene (plastic) container that can be used to carry flammable liquids in quantities up to 5 gallons (18.93 liters). These containers must be accepted as satisfactory to contain flammable liquids by a nationally recognized testing lab, such as Underwriters Lab (UL) or Factory Mutual (FM).
Aramid: The generic name for a high-strength, flame-resistant synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.
Arch: Any device attached to the back of a mobile vehicle and used for raising one end of logs to facilitate movement.
All-Terrain Vehicle (ATV): a vehicle that: a) travels on low pressure tires; b) has a seat that is straddled by the operator; c) has a handlebar for steering control; and d) is meant for off-road use. An ATV can be either a three-wheeler or a four-wheeler.
Authorized person: See “Designated Person.”
Auxiliary: Also called light plant or generator. Engine which provides additional electricity to vessel.

B
Backcut (falling cut)**:** The cut opposite of the face cut.
Ballistic nylon: A nylon fabric of high tensile properties designed to provide protection from lacerations.
Base of tree: That portion of a tree that is not more than 12 inches above highest ground level.
Behavioral Healthcare: Includes treatment for mental health conditions, substance misuse and other addictions; treatments such as psychotherapy, psychiatric medications, support groups, etc., for these behavioral disorders are referred to as behavioral healthcare services.
Bight of the line: A hazardous zone created by one or more lines under

tension, or a point on a line where a rigging chain is attached.
Bilge: Deepest portion of the interior of a vessel. Place where water accumulates easiest.
Binder: A hinged lever assembly for connecting the ends of a wrapper to tighten the load restraining devices such as used on log trucks, flatbeds, lowboys, etc.
Boundary Line: A regulatory line for commercial fishing safety regulations that generally runs from the outermost point of land to the outermost point of land.
Bow: Forward end of vessel.
Bouyant Apparatus (BA): A survival craft meeting the requirements of near shore vessels. It does not provide out of water flotation and is meant for warm waters. See IBA.
Brow log: A log placed parallel to any roadway at a landing or dump site to protect carriers while loading or unloading.
Buck: To cut a fallen tree into logs.
Buffer Strip: Also known as a filter strip, a buffer strip is vegetation, usually grasses, which is planted alongside streams and varying in width from 30 to 100 feet or more (9.14m to 30.48m), to help curtail fertilizer, pesticides, manure and other undesirable substances from readily flowing into waterways.
Bulkheads: Walls between different compartments of a vessel. Often bulkheads are watertight.
Bulwarks: Sides of the vessel above the decks.
Bump Cap: Protective headgear that is lightweight with a thinner shell than a hard hat. A bump cap does not have a suspension system to absorb impacts.
Butt: The bottom cut or the first log of a fallen tree.
By-catch: The incidental taking of non-targeted fish species.
Bystander: A person who is present at or near an agricultural work site without participating in the work.

C
Capstain (Gypsy Head)**:** Vertical or horizontal drums fitted to a windlass for handling the line portion of working lines as for anchors, mooring lines or fishing gear.
Cable yarding: The movement of trees or logs from the area where they have been fallen to a landing by attaching them to a cable system that is supported by a metal tower (woodspar) and/or intermediate support or tail trees.
Categorical Variables—Production Agriculture: Used to define specific descriptive characteristics of injury incidents in production agriculture. Preferred categories and category titles are.

Type of Operation	Source of Injury	Injury Severity*	Activity at Time of Injury
Crops & Livestock Cash Grains Only	Tractor	First aid	Animals, feeding
Hay Crops Only	Field Machine	Temporary Disabling	Animals, moving/loading/ sorting, etc.
Vegetable, fruit, nuts	Self-propelled farm machine	Permanent Disability	Animals, treating, vaccinating, ear tagging, shoeing, etc.
Greenhouse, Nursery, Floriculture	Farmstead Machinery	Fatality	Animals, other handling
Beef Only	Non-powered wagon or cart		Machinery service or repair
Swine Only	Livestock		Building/Structure service or repair
Sheep, Goats Only	Hand Tool		Field work (tillage, planting, harvesting)
Poultry Only	Power Tool		Traveling between locations
Dairy Only	Pesticide/Chemical		Storing /Handling harvested crops
Horse Only	Plant/Tree		Manual handling of containers, bags, pots, materials, etc.
Other Animal Only (Specify)	Building/Structure		Powered handling of containers, bags, pots, materials, etc.
	Working Surface		Other (specify)
	Truck/Auto		
	ATV/MUV		
	Other (Specify)		

*See further descriptions under Injury Severity

Location of Incident	Nature of injury	Type of Event	Part of Body Injured
Field, pasture	Amputation	Caught in/by	Head/neck
Barn--outdoor pen feedlot, corral, paddock	Bruise	Caught between	Eye
	Burn	Caught under	Chest/trunk
	Cut	Contact sharp object	Back
	Crush		Arm/shoulder
Barn--indoor pen, feedlot, corral, paddock	Fracture	Entanglement	Finger
	Puncture	Fall, same level	Hand/wrist
	Sprain/strain	Fall, elevation	Leg/knee/hip
	Multiple injury	Overexertion	Foot
Barn—other area	Other (Specify)	Struck by/against	Multiple parts
			Other (Specify)
Non-barn structure (manure pond, silo, packing shed, greenhouse, etc.)		Struck by falling	
		Struck by flying	
		Other (Specify)	
Other farmstead area			
Roads, lanes (Specify)			

Census of Fatal Occupation Injury (CFOI): A Federal-State cooperative program implemented in all 50 States and the District of Columbia. To compile counts that are as complete as possible, the census uses multiple sources to identify, verify, and profile fatal worker injuries. To ensure that fatalities are work-related, cases are substantiated with two or more independent source documents, or a source document and a follow-up questionnaire. CFOI uses these definitions and explanations in deciding cases to include or exclude.

- **Traumatic injury—**A traumatic injury is any unintentional or intentional wound or damage to the body resulting from acute exposure to energy--such as heat or electricity or kinetic energy from a crash--or from the absence of such essentials as heat or oxygen caused by a specific event, incident, or series of events within a single workday or shift.
- **Occupational disease (illness)—**An occupational disease is defined as a condition produced in the work environment over a period longer than one workday or shift. Usually an illness is due to repetitive factors over a period of time. It may result from systemic infection, repeated stress or strain, exposure to toxins, poisons, fumes, or other continuing conditions of the work environment.
- **Work Relationship Criteria—**A *work relationship* exists if an event or exposure results in the fatal injury or illness of a person: (1) ON the *employer's*

premises and the person was there to *work;* or (2) OFF the *employer's premises* and the person was there to *work,* or the event or exposure was related to the person's *work* or status as an employee. The *employer's premises* include buildings, grounds, parking lots, and other facilities and property used in the conduct of business. *Work* is defined as duties, activities, or tasks that produce a product or result; that are done in exchange for money, goods, services, profit, or benefit; and, that are legal activities in the United States. The following are clarifications of the CFOI work relationship criteria.

- **Volunteer workers:** Fatalities to volunteer workers who are exposed to the same work hazards and perform the same duties or functions as paid employees and that meet the CFOI work relationship criteria are IN scope.
- **Institutionalized persons:** Fatalities to institutionalized persons, including inmates of penal and mental institutions, sanitariums, and homes for the aged, infirm and needy, are OUT of scope unless they are employed off the premises of their institutions.
- **Suicides** and **homicides** that meet the CFOI work relationship criteria are IN scope.
- **Fatal heart attacks** and **strokes** are IN scope if they occurred ON or OFF the employer's premises and the person was there to work. Those fatal heart attacks and strokes that occurred under other circumstances are OUT of scope, unless work relationship is verified.
- **Recreational activities:** Fatal events or exposures that occurred during a person's recreational activities, that were not required by the person's employer, are OUT of scope.
- **Travel status:** Fatal events or exposures that occurred when a person was in travel status are IN scope if the travel was for work purposes or was a condition of employment.
- **Commuting:** Fatal events or exposures that occurred during a person's commute to or from work are OUT of scope.

CFVISAC: Commercial Fishing Industry Vessel Advisory Committee- Federal advisory committee to the Coast Guard on recommendations on fishing vessels safety. Established by the Commercial Fishing Vessel Safety Act of 1988.

Child (pl Children): Individuals in the age range of birth through 12 years of age.

Childhood: The period of life from infancy to adulthood (birth through 17 years of age).

Chock: A block, often wedge-shaped, which is used to prevent movement; for example, a log from rolling, a wheel from turning.

Choker: Length of wire rope, chain or synthetic material with attachments for encircling a log, pole or other material to be moved.

Competent (Safety & Health) Person: A qualified person who has been authorized by the employer or employer representative to:

(a) Identify existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to employees, and

(b) Eliminate the hazard or take corrective action.

Concentrated Animal Feeding Operation (CAFO): A subcategory of an AFO (see Animal Feeding Operation) and that is further defined as a Large CAFO or

as a Medium CAFO, or that is designated as a CAFO by the U.S. Department of Environmental Protection (See also Code of Federal Regulations Title 40, Part 122, Section 122.23 for additional details).
Confine a fire: To restrict the fire within determined boundaries established either prior to the fire or during the fire.
Contain a fire: To take suppression action, as needed, which can reasonably be expected to check the fire's spread under prevailing conditions.
Control a fire: To complete control line around a fire, and spot fires there from and any interior islands to be saved; burn out any unburned area adjacent to the fire side of the control lines; and cool down all hot-spots that are immediate threats to the control line, until the lines can reasonably be expected to hold under foreseeable conditions.
Cumulative Trauma: Bodily injury from mechanical stress which develops gradually over weeks, months, or years from repeated stress (force or exertion) on a particular body part.
Cut-up-tree/snag: A tree/snag, left standing, with the falling cuts started or completed.
Cutter: One whose primary job is to manually fall, buck, or limb trees.

D
Danger tree: A standing tree, alive or dead, that presents a hazard to personnel due to deterioration or physical damage to the root system, trunk (stem), or limbs, and the degree and direction of lean.
DBH: Diameter at breast height.
Deadman: Buried log or other object used as an anchor.
Deck: A stack of trees or logs.
Designated person: An individual who has been assigned by the employer or the employer representative to perform a specific duty or duties.
Developmentally-appropriate Tasks: Tasks that are suitable based on demarcations noting achievement of physical and psychological maturity. Developmentally- appropriate task guidelines are applicable outside of enforceable work standards. See also age-appropriate work
Direct supervision: Supervision by a competent person who watches over and directs the work of others who are within sight and unassisted natural voice contact. **NOTE:** Direct supervision may be achieved by radio contact when an untrained runner is en route to or from an operational area where there may be exposure to wildland fire hazards, provided there is a competent person at both the pick-up and drop-off points.
Domino falling: The partial cutting of several trees which are left standing and then pushed over with a pusher (driver) tree. This definition of domino falling does not include the falling of:

(a) A single danger tree by falling another single tree into it.
(b) Two or more trees at the same time because their limbs are interlocked.

Double tree intermediate support system: A system for supporting a loaded skyline in a support jack suspended on a single piece of wire rope that is

supported by two trees in a manner that provides for sharing the load between the two trees.
Downrigger: Apparatus for lowering fishing gear down into water.
Downflooding: Entry of water into the hull which results in progressive flooding and loss of stability.
Dredges: Fishing gear that is dragged along sand or mud sea bottoms, usually to collect mollusks. The vessel drops a frame dredge to the sea floor and it is dragged across the seabed. The catch is held in a bag or sieve which allows the water, sand or mud to run out.
Drum: Where long line is wound around to deploy and take up; part of a winch.

E
E codes: Codes for external cause of injury that provide a systematic way to classify information put into the medical records by hospital staff.
EEZ: Exclusive Economic Zone. Extends 200 from shore and within this only U.S. vessels may fish.
Emergency care: Care provided by a person who is first aid and CPR trained.
Emergency medical service: Care provided by a medically trained person such as in a hospital, clinic, ambulance or rescue vehicle.
Emergency scene: A site that is:
Immediately threatening to life, health, property or environment.
Has already caused loss of life, health detriments, property damage or environmental damage; or
Has a high probability of escalating to cause immediate danger to life, health, property or environment
EPIRB: Emergency Position Indicating Radio Beacon. Transmits radio beacon to satellite to locate vessel in distress.
Equipment: See “Vehicle” and “Machine.”
Equipment protection designations: The listing of specific guarding requirements for specific logging machines.
Escape route: A planned and understood route to move to a safety zone or other low-risk area.
Experienced person: A person who has sufficient knowledge, training, experience and skill in all aspects of a given process or procedure.
Exposure: Contact or proximity to a condition or event which may produce injury, disease, illness, property or environmental damage.
Extreme weather conditions: Includes, but not limited to:
(a) Strong winds (applies to timbered areas only) – Wind velocity that reaches sufficient force to blow limbs from standing trees, cause windfalls, or prevent cutters from falling trees in the desired direction;
(b) Impaired vision – Conditions such as falling snow, sleet, mist, fog, rain, dust, or darkness which substantially impairs visibility to the extent that employees cannot clearly see signals, moving vehicles, equipment and lines, falling trees or other hazards;

(c) Hazardous snow or ice conditions – Snow or ice conditions which prevent escape from hazards such as falling trees, moving logs, vehicles, or similar hazards; or
(d) Lightning.

F

Factory ship: Ship in which fish are processed and frozen. May also catch fish or just obtain fish from smaller catcher vessels.

Fairlead: Sheaves, rolls or a combination thereof arranged for receiving a line coming from any direction to minimize the line from burning and aid proper line spooling onto a drum.

Fall: To cut down trees.

Faller: A person who falls (cuts down) trees.

Farm and Agricultural Injury Classification (FAIC) Code: An American Society of Agricultural and Biological Engineers Standard (S575.1) to guide the inclusion or exclusion of injury cases typically assigned to the agriculture sector by researchers, educators, and other groups interested in farm and agricultural sector injuries. The code uses the North American Industry Classification System (NAICS) to help delineate Agriculture, Forestry, Fishing and Hunting occupational injury incidents from injury incidents that do not occur in the course of agricultural sector work.

FAIC-1. Farm Production Work (NAICS 111, Crop Production; 112, Animal Production). Victim engaged in work activity related to agricultural production.

FAIC-2. Forestry and Logging (NAICS 113). Victim engaged in work related to growing and harvesting timber on a long production cycle (i.e., of 10 or more years)

FAIC-3. Fishing, Hunting & Trapping (NAICS 114). Victim engaged in a work activity related to commercial fishing, hunting or trapping (NAICS 114). These industries involve harvesting fish and other wild animals from their natural habitats and are dependent upon a continued supply of the natural resource.

FAIC-4. Agricultural and Forestry Support Activities (NAICS 115). Victim engaged in work activity related to custom hired and contracted services that are an essential part of agricultural and forestry production (NAICS 11511–115310).

FAIC-5. Farm Hazard Exposure, Outside Services. Victim associated with a business or service and injured on a farm while providing services to the farm.

FAIC-6. Farm Hazard Exposure, Non-workers: Equipment, Tools, Objects & Products. Victim engaged in an activity involving agricultural machines, equipment, tools, products, etc., but not related to farm production operations.

FAIC-7. Farm Hazard Exposure, Non-workers: Structures and Landscape. Victim not actively engaged in a work activity but injured as a result of exposure to hazards of farm structures and landscape.

FAIC-8. Farm Hazard Exposure, Non-workers: Animals. Victim not actively engaged in a work activity but injured as a result of exposure to agricultural animal hazards.

FAIC-9. Farm Hazard Exposure: Roadway Collision. Victim not actively engaged in a work activity but injured as a result of collision with agricultural hazard on roadway. (ASABE)

Family Farms: Any farm organized as a sole proprietorship, partnership, or family corporation. Family farms exclude farms organized as non-family corporations or cooperatives, as well as farms with hired managers (see Non-family Farms). Family farms are further divided by gross sales:

Small family farms-- Gross sales less than $250,000:

Limited-resource farms. Small farms with gross sales less than $105,000 in 2004, less than $110,000 in 2005 (subsequent years is adjusted by the index of prices paid by farmers).

Retirement farms. Small farms whose operators report they are retired.

Residential/lifestyle farms. Small farms whose operators report a major occupation other than farming.

Farming-occupation farms. Small family farms whose operators report farming as their major occupation.

Low-sales farms. Gross sales less than $100,000.

High-sales farms. Gross sales between $100,000 and $249,999.

Large-scale family farms-- Gross sales of $250,000 or more.

Large family farms. Gross sales between $250,000 and $499,999.

Very large family farms. Gross sales of $500,000 or more.

Farm: Any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold during the census year (standard United States Department of Agriculture definition).

Point Farm: If a farm does not have a $1,000 worth of sales, a “point system”, devised by USDA, assigns values for acres of various crops and heads of various livestock species to estimate a normal level of sales. Point Farms are farms with less than $1,000 sales but have points worth at least 1,000 points.

Farm Vehicle: Any motorized vehicle used for agricultural operations either on or off the agricultural work site. This definition includes, but is not limited to, trucks and automobiles.

Farm Worker: A person who is employed by a farm owner to conduct agricultural work. This term includes migrant and seasonal laborers.

Farm/Ranch Work-Related Injury: An injury occurring during the business of operating a farm or ranch *and* which resulted in 4 hours or more of restricted activity. See Restricted Activity.

Farrow-to-Finish Operation: The production of swine which involves maintaining a herd of sows to birth (farrow) piglets, which are then raised to market size and sold by the same farm.

Fathom: a length or depth of 6 feet

Fire camp: Geographical site(s) equipped and staffed to provide sleeping, food, water and sanitary services to fire personnel.

Fire fighting equipment: All portable and fixed fire suppression and control equipment.
Fire shelter: A personal protection item carried by firefighters which when deployed unfolds to form a pup-tent shelter of heat reflective materials.
Fisherman's Fund: An Alaska state managed self insurance pool which takes a percentage of the cost of a crew license and puts it in a dedicated fund to reimburse fishermen for injuries.
Fisheries Observer: A National Marine Fisheries Service employee or contractor who is aboard a vessel to document catch size, by-catch etc. There are about 20 fisheries in U.S. with observers.
Flame resistance: The property of material, or combinations of component materials, to retard ignition and restrict the spread of flame.
First on the Scene: Training for farm families and workers that incorporates decision-making when discovering a farm injury victim, reporting an emergency, attempting emergency first aid, and taking other actions.
FOPS (Falling Object Protective Structure): Overhead cover installed on a protective frame or enclosure of off-road equipment to reasonably protect operators from falling objects such as trees, rocks, etc.
Fore: The forward portion of the vessel.
Forepeak: The forward interior-most portion of vessel.
Forest: public or private forest lands exclusive of municipal parks and urban forests.
Forestry workforce: All forest workers engaged in forest activity operations including but not limited to: chemical application; chipping; clearing and slash disposal; forest road construction, maintenance and decommissioning; log dumps; ponds; plantsite log yards and independent sort yards; log hauling; marking; prescribed fire; pulpwood and non-pulpwood logging; reforestation/vegetation management; stream restoration; timber cutting and thinning operations; timber cruising; tree climbing activities; wildland fire suppression.
Free surface: The shifting of liquids in a tank that can negatively affect the stability of a vessel.
Freeing ports: Holes just above outside deck which allow water to drain from deck surface.

G
Gantry: frame-like structure for hauling back fishing gear such as trawls.
Gillnet: Net stretched from back of smaller vessels to capture salmon by gills. Usually fish close to shore and in rivers.
Give way vessel: A vessel due to its relationship to another that is deemed to change its course and speed to avoid a collision.
GMO: Genetically Modified Organisms. A genetically modified organism is an organism such as plant or animal, with an artificially modified genetic make-up.
Ground tackle: Anchor, chain and rope used in anchoring a vessel.
Grounded (Forestry)**:** Placement of a tree on the ground.
Grounded (Electrical)**:** A method to dissipate static or electrical charges.

Grounded (Machines)**:** The placement of a machine component on the ground or device where it is firmly supported.
Guard: A protective device designed and fitted to reasonably minimize the possibility of inadvertent contact with machinery hazards, as well as to restrict access to other hazardous areas. There are four types of guards: shield or cover, casing, enclosure, and barrier.
Guyline: A standing line used to support or stabilize a spar, tail tree, intermediate support tree, electrical pole, machinery or equipment.
Gurdie: Salmon troller hydraulic gear that bring up the lines.

H
Hawse pipe: Holes that go through the bulwarks through which anchors and line may pass.
Hazard: Any existing or potential condition which, by itself or by interacting with other variables, can result in injury, illness, death, or other losses.
Health: A state of positive physical, mental, and social well-being to include the ability to lead a socially and economically productive life and not merely the absence of disease or infirmity.
Health care provider: A health care practitioner operating within the scope of their license, certificate, registration, or legally authorized practice.
Health Care Professional Shortage Area: Regions of the country, usually rural areas, in which the number of available health care professionals such as family doctors, dentists and mental health professionals per 100,000 persons are well below the national average. The determination of health care professional shortage area is made by state and federal officials. These areas are deemed "underserved" in the field, such as mental health, where there is an undersupply of available health care professionals to deliver service. Through the National Health Service Corps, licensed mental health care professional may receive inducements, such as repayment of education loans, to practice in a designated mental health care professional shortage area.
Heaving to: A heavy weather tactic involving drifting with no forward motion, often assisted with a drag to keep the bow into the seas.
High lead: A system of logging where the mainline is threaded through the mainline block which is located near the top of the spar or metal tower to obtain a lift of the logs being yarded and is returned to the vicinity of the logs by a haulback line.
High Seas: Outside of the three mile line from shore.
High visibility colors: Bright or fluorescent white, lime green, orange, yellow, red, or aqua colors that stand out from the surrounding background color so as to make them easily seen.
Hydrostatic release: A mechanism that automatically releases survival gear such as life rafts and Emergency Position Indicating Radio Beacons. Usually operates once underwater 12-15 feet.

I

Immersion suit: Also called a survival or “gumby” suit. Coverall like garment that provides flotation and hypothermia protection to wearer.
Individual Fishing Quota (IFQs): See ITQs.
Individual Transferable Quotas (ITQs): Regulatory systems that allocate fishing privileges to individual participants in the fishery. An individual quota may be a percentage or fixed portion of the total allowable catch (TAC) of the fishery and it can be leased, sold or otherwise transferred. Conditions may be attached to the quota and it may be withdrawn if fishing regulations are not complied with. Similar to IFQs.
Inflatable Buoyant Apparatus (IBA): An inflatable raft without canopy or ballast pockets which provides out of water protection. Required for fishing vessels a moderate distance from shore.
Injury: Physical harm or damage to some part of the body resulting from an exchange of mechanical, chemical, thermal, electrical, or other environmental energy that exceeds the body's tolerance.
Injury Control: Incorporates multiple activities to reduce frequency and/or severity of injury, including prevention, treatment, and rehabilitation.
Injury Prevention: Attempts to reduce the incidence of injury, usually through educational, engineering, administrative, environmental, and enforcement interventions.
Injury Severity: Describes the seriousness of injury to a victim. Preferred categories include

- **First aid injury --** An injury requiring first aid treatment only; less than 4 hours of loss time or restricted activity.
- **Temporarily disabling--** Injury results in 4 hours or more of lost time or restricted activity.
- **Permanent disability--** Injury results in loss or use of one or more body parts, e.g., amputation, blindness, spinal column injury.
- **Fatal--** Loss of life.

In the clear: A position within the work area where the probability of hazardous contact with vehicles, machines, falling trees, moving logs, rootwads, chunks, material, rigging, and equipment is minimized by distance from the hazards and/or use of physical barriers, such as stumps, trees, terrain, or other objects providing protection.
Initial attack (fire)**:** The control efforts taken by all resources which arrive at the fire during the first burning period (first 24 hours).

J

Jacklines: Lines running fore and aft on deck that can be hooked into to prevent being washed overboard.
Jones Act (1920): The Jones Act was written by Congress to help injured seamen and determines liability. The Jones Act also protects U.S. interests within its own waters and ensures that the United States maintains a fleet of merchant ships.

K

Kicker (Forestry, cutting)**:** A piece of the face, or an equivalent object, placed in one side of a face cut to pull the tree from its lean as it falls.
Kicker (Fishing)**:** a small outboard motor which acts as a back up to the main motor or is used in trolling.
Kicker (Production Agriculture)**:** A farm animal, such as a milk cow or horse, that is known to kick at humans, other animals or restraining devices.

L
Landing: Any designated place where logs are laid after being yarded and are awaiting subsequent handling, loading and hauling.
Landing chute: The head of the skid trail or yarding road where the logs are temporarily placed and are awaiting subsequent handling, loading, and hauling.
Lay (forestry, cutting)**:** The desired direction of fall for a tree.
Lay (wire rope)**:** A unit of measure to describe the straight-line distance in which a strand of wire rope makes one complete spiral around the core of a rope. The way wires have been laid to form strands and the way strands have been laid around the core (i.e., regular, lang lay, etc.).
Lay (fiber rope)**:** The direction in which the rope strands are twisted.
Limbing: To cut branches off trees.
Line: The name given to most of the rope on a vessel.
Lodged tree (hung tree)**:** A tree leaning against another tree or object which prevents it from falling to the ground.
Log (Forestry)**:** A segment sawed or split from a fallen tree, such as, but not limited to, a section, bolt, or tree length.
Log (Fishing)**:** A book in which navigation, safety, and fish records are kept on a vessel.
Log dum: An area in which logs are removed from a truck or rail car. May be either dry land or water, parbuckled over a brow log or removed by machine.
Logging: All operations relating to the falling of trees, cutting the fallen trees into suitable lengths, yarding, limbing, debarking, grading, loading, hauling, unloading, storing in decks or ponds until processed from timber to wood products.
Longline Fishing: Uses a main line that is anchored horizontally above the seabed with baited hooks on branch lines running off at periodic intervals. Longlines are supported in the water by a series of floats. Off the main line are branch lines with baited hooks. Longlines are used for catching demersal and pelagic fish. The quality of the catch is generally good because the fish are not crushed together as they would be in a net, although longlines sometimes capture non-target fish or other marine animals.

M
Media Advocacy: A strategic use of multiple media outlets intended to inform or influence a social change or public policy initiative.
Migrant Farmworker: An individual whose principle employment is in agriculture on a seasonal basis, who has been so employed in the last 24 months, and establishes for the purposes of such employment a temporary abode.

Minimum Data Set: Pre-determined, basic types of information collected consistently on all injury cases.
Machine (Forestry)**:** Equipment used or intended for use in forest activities operations such as but not limited to building or maintaining roads; felling trees; processing trees or fiber; yarding, moving or handling logs, trees, chunks and other material; stream restoration; forest operations for wildlife enhancement or other management objectives; and wildland fire suppression.
Mainline (Forestry, yarding)**:** The line that moves the turn of logs toward the yarder in any given system.
Mechanized falling: Falling of standing timber by a self-propelled, mobile-wheeled or tracked machine equipped with a shear or other powered cutting device.
Metal tower: A vertical or leaning metal tube or boom used for yarding logs by various methods of cable logging.

N
NASS: The National Agricultural Statistics Service (NASS), housed within the US Department of Agriculture, is the primary agency in the US for collecting economic and production data on agricultural operations. In addition, NASS is responsible for conducting the Census of Agriculture. Since 1994, NASS has collaborated with NIOSH to conduct national occupational and childhood safety and health surveys of the production agriculture industry.
NIOSH: National Institute for Occupational Safety and Health. http://www.cdc.gov/niosh/.
NRTL: (Nationally Recognized Testing Laboratory)**:** An organization which is recognized by OSHA in accordance with OAR 437, Division 2/A, §1910.7, Appendix A, OSHA Recognition Process for Nationally Recognized Testing Laboratories.
Nonfamily Farms: Farms organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers. Also includes farms held in estates or trusts.
NORA: National Occupational Research Agenda. A multipartite partnership designed to develop an agenda for occupational safety and health research for the United States. http://www.cdc.gov/niosh/nora/.
North American Industry Classification System (NAICS): The official classification system to be used by the U.S. statistical agencies to classify business establishments. It is the first economic classification system to be constructed based on a single economic concept. Economic units that use like processes to produce goods or services are grouped together. The major sector of Agriculture, Forestry, Fishing and Hunting and its major subsectors are described below. Consult the NAICS manual for further details.

> **NAICS 11 Agriculture, Forestry, Fishing and Hunting:** The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats. Excluded

from the Agriculture, Forestry, Hunting and Fishing sector are establishments primarily engaged in agricultural research and establishments primarily engaged in administering programs for regulating and conserving land, mineral, wildlife, and forest use.

111 Crop Production: Industries in the Crop Production subsector grow crops mainly for food and fiber. The subsector comprises establishments, such as farms, orchards, groves, greenhouses, and nurseries, primarily engaged in growing crops, plants, vines, or trees and their seeds. Industries in the Crop Production subsector include establishments that own, operate, and manage and those that operate and manage. Those that manage only are classified in Subsector 115, Support Activities for Agriculture and Forestry.

112 Animal Production: Industries in the Animal Production subsector raise or fatten animals for the sale of animals or animal products. The subsector comprises establishments, such as ranches, farms, and feedlots primarily engaged in keeping, grazing, breeding, or feeding animals.

113 Forestry and Logging: Industries in the Forestry and Logging subsector grow and harvest timber on a long production cycle (i.e., of 10 years or more). Long production cycles use different production processes than short production cycles, which require more horticultural interventions prior to harvest, resulting in processes more similar to those found in the Crop Production subsector. Consequently, Christmas tree production and other production involving production cycles of less than 10 years are classified in the Crop Production subsector.

114 Fishing, Hunting and Trapping: Industries in the Fishing, Hunting, and Trapping subsector harvest fish and other wild animals from their natural habitats and are dependent upon a continued supply of the natural resource. The harvesting of fish is the predominant economic activity of this subsector and it usually requires specialized vessels that, by the nature of their size, configuration and equipment, are not suitable for any other type of production, such as transportation. Hunting and trapping activities utilize a wide variety of production processes and are classified in the same subsector as fishing because the availability of resources and the constraints imposed, such as conservation requirements and proper habitat maintenance, are similar.

115 Support Activities for Agriculture and Forestry: Industries in the Support Activities for Agriculture and Forestry subsector provide support services that are an essential part of agricultural and forestry production. These support activities may be performed by the agriculture or forestry producing establishment or conducted independently as an alternative source of inputs required for the production process for a given crop, animal, or forestry industry. Establishments that primarily perform these activities independent of the agriculture or forestry producing establishment are in this subsector.

North Pacific Fishing Vessel Owners Association (NPFVOA): A non-profit organization that conducts training and produces educations materials to commercial fishermen based in Seattle.

NVIC 5-87 (Fishing)**:** Coast Guard list of voluntary fishing vessel safety recommendations from 1987.

O

OPS (Forestry, Operator Protective Structure)**:** Structures or enclosures whose primary purpose is to minimize the possibility of operator injury from hazards, such as whipping saplings, branches, jill-poking and snapping winch lines with the least adverse effect on operator visibility, comfort, and protection from other hazards. Specific standards and tests exist and are referenced in many national and state codes.

Occupational Disease: A disease caused by exposure to environmental factors associated with employment.
Occupational Illness: Any abnormal physical condition or disorder, other than one resulting from occupational injury, caused by exposure to environmental factors associated with employment.
Occupational Injury: An injury suffered by a person arising out of and in the course of employment involving a single incident in the work environment.
Outrigger: Poles or booms on either side of a vessel from which stabilizers or fishing gear can hang from.

P

Paid Firefighter: Any employee whose primary duty is fire suppression and control of fires.
Pass line: A small line threaded through a block at or near the top of a wood tree or metal tower to assist the high climber.
Permanent Disability: A permanent impairment of a bodily function or loss of use of a body part due to an occupational injury or illness; an enduring non-fatal physical or mental impairment as a result of an injury that prevents or restricts normal achievement.
Permanent Partial Disability: Injury other than death or permanent total disability that results in some loss, or complete loss, of any use of any member or part of a member of the body, or any permanent impairment of functions of the body, or part thereof, regardless of preexisting disability of the injured member or impaired body function.
Permanent Total Disability: Non-fatal injury that permanently and totally incapacitates and prevents an employed person from following any gainful occupation, or which results in some loss, or the complete loss, of the use of any of the following inn a single incident: (a) both eyes; (b) one eye and one hand, arm, leg or foot; (c) any two of the following not on the same limb: hand, arm, foot or leg.
Personal Protective Equipment (PPE): Any material or device worn to protect a person’s/worker’s head, body, feet and extremities from exposure to or contact with any harmful substance or form of energy. Commonly used PPE in agriculture include steel-toed shoes, gloves, safety goggles, sunscreen, ear plugs, and masks.

Port: Left side of the vessel when facing forward.
Potential failure zone: An area that could be impacted by the failure of any part of a standing tree anchor, tail or intermediate support tree as the result of forces or loads imposed on the tree by guylines, running lines or skylines. The boundaries of the zone encompass the area into which the tree, or parts of the tree, could fall, slide or roll and all trees, logs, lines and material impacted by the tree failure.
Pots: Traps in the form of cages or baskets with one or more openings or entrances. They can be made from various materials (such as wood, wicker, metal rods, etc.). They are usually set at the bottom, with or without bait, singly or in rows, connected by ropes (buoy-lines) to buoys showing their position on the surface.
Prescribed Fire: Any fire burning under predetermined conditions to meet specific objectives related to fuels reduction or habitat improvement.
Production Agriculture: A term used to replace "farming" and "ranching" since it has broader application to the wide range of complex machinery, sophisticated crop and livestock management practices, and relationships with associated agricultural businesses.
Purse Seines: A wall of netting with a gathered, or "purse," line at the bottom. The net is deployed around the fish and the purse line enables it to be closed like a purse to catch the fish. Purse seines may be very large and are sometimes operated by two boats, although in most cases only one boat is used, with or without a skiff (a small auxiliary boat). Tuna purse seiners are large vessels, equipped to handle very large purse seine nets for tuna.

Q
Qualified first aid person: Has evidence to show valid first aid and CPR training within the last 2 years.
Qualified person: A person who has:

(a) A recognized degree, certification, professional standing, knowledge, training or experience

(b) Successfully demonstrated the ability to perform the work, solve or resolve problems relating to the work, subject matter, or project.

Quarter: This is the port or starboard stern of a vessel.
Quartering seas: Seas taken on one of the vessel's quarters.

R
Reach: Usually a rectangular steel tube which slides in the trailer tunnel and is used as a connection between a log truck and the trailer.
Reforestation: All forest management operations relating to the planting and nurturing of trees. The nurturing of trees includes: fertilization, pre-commercial thinning, mulching, pruning, animal control measures, application of chemicals, and stand inventories.
Regional Fishery Management Councils: Established by the Magnuson-Stevens Fishery Conservation and Management Act to prepare Fishery

Management Plans and amendments for fisheries in the U.S. Exclusive Economic Zone (EEZ).

Research to Practice (r2p): Focuses on the transfer and translation of research findings, technologies, and information into highly effective prevention practices and products for use in the workplace. Research-to-practice also promotes approaches that foster the active involvement of early innovators, customers, users and decision makers so that research findings will have an enhanced potential for impact. The most important aspects of a successful r2p effort are (1) involving partners throughout all phases of the research process—from conceiving, planning, conducting, translating, through evaluating research; and (2) building r2p principles into the evaluation system for each intramural and extramural research project and program.

Reserve buoyancy: Watertight compartments which positive affect buoyancy.

Restricted Activity: The inability to perform normal activities; a change in work performance as a result of an injury.

Righting arm: The tendency of a vessel to right itself when an outside force such as wind or seas acts on it.

Risk: A measure of the combined probability and severity of possible harm; mathematically, risk is the product of probability x severity.

Risk Acceptance: The acceptance by an individual or organization of a level or degree of risk identified as the possible consequence of a course of action.

Risk Assessment: The process of determining the degree of threat that is posed by one or more hazards.

Risk Control: The process of minimizing unwanted loss by anticipating and preventing the occurrence of unplanned events.

Risk Evaluation: A comparison of calculated risks, or public health impact, of exposure to an agent with the risks caused by other agents or societal factors, and with the benefits associated with the agent, as a basis for deciding risk acceptance.

Risk Management: The professional assessment of all loss potential in an organization's operations leading to establishment and administration of a comprehensive loss control program.

Risk Perception: The subjective assessment of the probability of a specified type of unwanted event happening and how concerned we are with the consequences.

ROPS (Roll-Over Protective Structure)**:** A cab or frame for the protection of operators of agricultural tractors, forestry and construction equipment to minimize the possibility of serious operator injury resulting from accidental upset.

Root wad: The root ball and dirt that is pulled from the ground when a tree or stump is uprooted.

Rub rails: Guarding on the exposed sides of elevated bridges, ramps or runways to prevent wheeled equipment from going over the edge.

Rub tree: A tree used to guide a turn around a certain area.

Runner: A person who delivers supplies, materials or relays information.

Running line: Any moving line in a cable yarding system.

S

Safety (Lay Person)**:** Freedom from those conditions that can cause danger, risk, or injury.

Safety (Professional)**:** The control of recognized hazards to achieve an acceptable level of risk.

Safety factor: The ratio of breaking strength to safe working strength or load.

Safety pin (shackle)**:** A threaded shackle pin secured by a nut that is secured with a cotter key, latchpin or molly.

Safety swede: A device that is designed for the specific purpose of making a positive connection to binders that are being closed (tightened) or opened.

Safety Zone: A designated area of sufficient size and suitable location that is expected to protect fire personnel from known hazards without using fire shelters, such as but not limited to an already burned area, previously constructed safety area, a meadow that won't burn, manmade or natural rocky area that is large enough and sufficiently devoid of fuels to take refuge without being burned.

SCBA: Self Contained Breathing Apparatus.

Sea chest: A space where a number of vessel through-hull fittings pass through the hull.

Seasonal Farmworker: An individual whose principle employment is in agriculture on a seasonal basis, who has been so employed in the last 24 months.

Seine Nets: Very long nets used to surround fish. They can be operated from the shore (beach seines) or from a vessel.

Seiner: mid size vessel with 5 to 6 crew that move seine net in circle in an area near surface to capture salmon, herring, tuna)

Seine skiff: Metal skiff with powerful engine that moves seine net in circle to enclose fish.

Serviceable condition: That quality of a tool, machine, vehicle, equipment, or other device to operate as it was intended to operate by the manufacturer.

Set Net (Gillnet)**:** Most have a series of floats at the top, and a series of weights at the bottom that keep the net upright in the water. Fish are caught as they swim into the net. The size of the mesh in the set net determines the size and species of fish caught. Used properly, this method is a selective fishing method.

Sheave: Roller, usually hydraulic, which fishing gear line passes through to bring onboard.

Short log (Chunks)**:** Any log or fiber less than 27 feet long.

Shot: A length of anchor chain or line. Generally 15 fathoms in length if anchor chain.

Single jack: One cutter, in an area or portion of standing timber, who falls and bucks.

Single tree intermediate support system: A system for supporting a loaded skyline in a support jack suspended from a single tree. The tree may be an upright single-rooted tree or a leaning tree severed or partially severed from the stump.

Siwash (Intentional)**:** The use of a natural physical object, such as a tree or stump, which changes the direction of a line rather than with a block.

Siwash (Unintentional)**:** When a line is incorrectly routed through standing timber or other objects or, as often occurs in side-hill yarding, the turn of logs pulls the bight of the line downhill and it hangs up on a stump, root wad or other object, changing the lead and creating a hazardous area.
Skate: A length of longline 1800 feet in length.
Skidder: A self-propelled machine, of the wheel or crawler design, or an animal used to move logs or trees to a landing.
Skidding: The movement of logs or fiber on the surface of the ground toward the place where they can be further processed or loaded.
Skyline: The line which is hung between two or more supports on which a carriage or block travels.
Slackline: A system of logging where a carriage travels on a skyline that can be raised or lowered. The carriage is pulled to the landing by the mainline (skidding line) and is returned to the vicinity of the logs by the haulback line or gravity. Slackline: any line without a load.
Slash burning: The use of prescribed fire as a method of forest management.
Slope (grade)**:** The increase or decrease in altitude over a horizontal distance expressed as a percentage. For example, change of altitude of 20 feet (6 m) over a horizontal distance of 100 feet (30 m) is expressed as a 20 percent slope.
Snag (Forestry)**:** Any standing dead tree or portion thereof.
Snag (Fishing)**:** A hangup of gear on the bottom.
Snubbing: Retarding or controlling the movement of logs or machines by attachment to another vehicle or stationary object.
Source of Injury--Primary: The source of injury or illness identifies the object, substance, bodily motion, or exposure which *directly produced or inflicted* the previously identified injury or illness. May also be referred to as the *primary* source of injury.
Source of Injury--Secondary: Identifies the object, substance, or person that *generated* the source of injury or illness or that *contributed to* the event or exposure.
Spring pole: A tree, segment of a tree, limb, or sapling which is under stress or tension due to the pressure or weight of another object.
Square lead: A horizontal angle of up to 90 degrees formed by the projected lines of the mainline from the drum of the logging machine through the block or fairlead and the yarding road.
SSB: Single Side Band - Marine radio with a range of hundreds of miles.

Stabilizers (“Birds”, on East Coast, or “Stabies”)**:** Winged metal pieces that extend from outriggers or poles and ride just below the surface of the water to give vessels a smoother ride.
Stability: The capacity of a machine or vehicle or vessel to return to equilibrium or to its original position after having been displaced.
Stability Baselines: Lines that can be drawn between the points where a vehicle’s tires or tracks rest on the ground. This term is most often used in reference to location of a vehicle’s center of gravity in the context of vehicle overturn or rollover.

Stand-on vessel: A vessel due to its relationship to another that is deemed to maintain its course and speed to avoid a collision
Starboard: Right side of the vessel when looking forward.
Station Bill: A list of emergency assignments for all crewmembers.
Stern ramp: The ramp in the stern of a trawler for shooting and retrieving the net.
Strip: A stand of timber or area of fallen and bucked timber in a predetermined location on which employees work in a planned pattern.
Supervisory personnel: Agent of the employer (such as a manager, superintendent, foreperson, hooktender, rigging slinger, or person in charge of all or part of the place of employment) who directs the work activities of one or more employees.
Swede connection: A line configuration consisting of wrapping two choker lines in the same direction around a tree or log and connecting the line nubbins to opposite line bells.
Swing cut: A back cut in which the holding wood on one side is cut through.
Swing radius: Is that distance equal to actual working radius of machines capable of upper structure rotation plus the length of the attachments, logs, and materials being handled

T
Tail hold: An anchor used for making fast any line or block other than a guyline.
Tail tree: The tree at the opposite end from the landing area on which rigging is hung.
Tender or Fish Packer: A larger vessel that carries the catch of smaller vessels to a processing plant.
Territorial sea: A regulatory line that extends 3 – 12 miles out from shore.
Through hull fitting: A connection, usually a pipe or a hose, from the hull to the outside. These can be below or above the water.
Tight line: When a force is exerted on both main line and haulback at the same time.
Timber cutting: The falling and/or bucking of trees by hand or mechanical means.
Topping: Cutting off the top section of a standing tree prior to rigging the tree for a spar or tail tree.
TOPS (Tip-Over Protective Structure)**:** A cab or frame designed for the protection of operators of front wheel drive turf and landscape equipment to minimize the possibility of serious crushing injury resulting from accidental lateral upset.
Tractor: A self-propelled machine of wheel or crawler design used to exert a push or pull force through drawn or mounted equipment to move objects or material.
Trawls: Towed nets consisting of a cone-shaped body, closed by a bag or codend and extended at the opening by wings. Strong steel cables (called warps) connect the net to the trawler. They can be towed by one or two vessels and may be used on the bottom (bottom trawls) or in mid-water (mid-water or pelagic

trawls). In some fisheries, vessels may tow two (or even four) trawls at the same time.
Trawler: Vessels which drag nets behind them to catch fish. These nets can be drug along bottom (bottom trawl) or mid water.
Trawl door: Metal door shaped weighs which sink trawl net and open it open.
Tree jack (shoe) (other than for directional falling use)**:** A grooved saddle of wood, soft metal or rollers contained within two steel side plates attached to a tree with a strap as a guide for a skyline, sail guy or similar static line.
Tree plates: Steel bars sometimes shaped as elongated "J"s which are fastened to a tree to hold the guylines and prevent the rigging from cutting into the tree when tightened. The hook of the "J" is also used to prevent the mainline block strap from sliding.
Trim: The level attitude of the vessel as it sits in the water.
Trolling: A method of fishing using lines with baited hooks that are dragged behind the vessel. Several lines (up to 20) are usually towed at the same time, with the help of outriggers. Weights can be attached to the lines if the target fish is found at a greater depth.
Troller: Vessels which use hook and line while underway mostly to catch salmon and tuna. Common on west coast and usually smaller vessels with few crewmembers.
Turn (Forestry)**:** Any log or group of logs or other material usually attached by chokers, grapples or other means and moved from a point of rest to the landing or landing chute area
Turtle Excluder Devices (TEDs): panels of mesh webbing or metal grids inserted into funnel-shaped shrimp trawl nets. As the nets are towed, shrimp and other small animals pass through the TED and into the codend of the net, the narrow bag at the end of the funnel where the catch is collected. Sea turtles, sharks, and fish too large to get through the panel are deflected out an escape hatch.

U
Undercut (Face)**:** A notch cut in a tree to guide the direction of the tree fall and help prevent splitting or kickback.
U.S. Marine Safety Association (USMSA): A non-profit group of marine safety equipment manufacturers.

V
V-lead (Forestry)**:** A horizontal angle of less than 90 degrees formed by the projected lines of the mainline from the drum of the logging machine through the block or fairlead and the yarding road.
Vehicle: A car, bus, truck, trailer or semi-trailer owned, leased or rented by the employer that is used for transportation of employees or movement of material. Any carrier that is not manually propelled.
VHF radio: Marine radio with a range of about 20 miles at sea.
Volunteer Firefighter: A person who performs or offers to perform a service voluntarily, such as suppression and control of fires.

W

Watcher/Firewatch: A person who visually observes the area on which operation activity occurred for the out-break of fire.
Wildcat: The sprocket wheel on a windless that engages the anchor chain as it is being hauled in.
Wildland Fire: Any non-structure fire, other than prescribed fire, that occurs in the wildland.
Wildlands fire fighting: All activities, operations, and equipment of employers and employees involved in the suppression or control of fires on wildlands. Does not include interior structural fire suppression or control.
Wildlife tree: A live, partially dead, or snag tree in the forest riparian zone, or in a cutting unit that is left for wildlife habitat. May also be a danger tree.
Winching: The winding of cable or rope onto a spool or drum.
Within the stakes: When the log center is below the top of the stakes.
Work area: Any area frequented by employees in the performance of assigned or related duties.
Wrapper (tie down)**:** A chain, cable, steel banding, synthetic rope or fiber webbing assembly used to contain a load of logs.

X

Y

Yarder: A machine with a series of drums used to yard logs.
Yarding: Movement of logs or trees from the place they were felled to an area where they can be further processed.

Z

Zoonotic diseases: Diseases caused by infectious agents that can be transmitted between (or are shared by) animals and humans.

References:

ASABE Standard 575.1: American Society of Agricultural & Biological Engineers
ABHT: Agricultural Behavioral Health Terms
C&A: Children and Agriculture: Opportunities for Safety & Health—A National Action Plan
DTSP: Dictionary of Terms Used in the Safety Profession
PFW: Primer on the Forestry Workforce
NAICS: North American Industry Classification System
NIOSH-AIS: NIOSH Agricultural Injury Survey
OIICM: Occupational Injury and Illness Classification Manual
Oregon Occupational Safety and Health Administration, Forest Activities Code. Division 7. Salem, OR
U.S. Coast Guard - Federal Requirements for Commercial Fishing Vessels booklet

U.S. Coast Guard - Navigation Rules (COLREGS)
U.S. DOL: U.S. Department of Labor
U.S. EPA: U.S. Environmental Protection Agency
U.S. Code, Public Health Services Act, Migrant Health
USDA-ERS: U.S. Department of Agriculture Economic Research Service