



## **NATIONAL OCCUPATIONAL RESEARCH AGENDA (NORA)**

### **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  
December 2008**

## PREFACE

For the first time in the U.S. there is a formal research and public health practice agenda for occupational safety and health for the industries of agriculture, forestry and fishing. Over a 20 month period, a dedicated group of individuals prepared the core content of this National Occupational Research Agenda (NORA) plan based on scientific evidence, public testimonies, peer reviews, and personal expertise associated with clinical practice, organization responsibilities and industry directives. **Crucial, substantive tasks for achieving the goals of this strategic plan are enhancing surveillance, producing guidelines and promoting evidence-based health and safety interventions for the agriculture, fishing, and forestry industries, and addressing the specific circumstances of vulnerable populations.**

We wish to express deep gratitude to the many people who provided input into the action plan. These included more than 40 individuals providing public and written comments, 31 corresponding members providing feedback on preliminary drafts, National Institute for Occupational Safety and Health (NIOSH) and National Farm Medicine Center staff who facilitated meeting arrangements, and NIOSH leaders who provided guidance to all the industry sector councils. The NORA Agriculture, Forestry, and Fishing (AgFF) Sector Council was especially productive and efficient because of the appointment and active participation of 35 dedicated people representing the three sub-sector groups and NIOSH. The Council met in-person four times and via teleconference many times during the development of this document. These meetings, combined with numerous electronic reviews, yielded valuable insights into key issues and guided the enumeration of priorities. The result is an action plan for the future with the goal of improving working conditions in some of our nation's most hazardous industries.

Members of the NORA AgFF Sector Council from January 2007 through 2008 are noted below. They generously gave their time to ensure this endeavor was successful. Captain Brad Husberg, NIOSH, was the engine behind the scenes that kept the work on track, while Hillary Strayer, MPH, NIOSH, provided editorial services. We are especially grateful to Dennis Murphy, PhD, of Penn State University for leading the development of the "Dictionary of Terms for Agriculture, Forestry, and Fishing Safety and Health Professionals" which is appended to this document. We encourage you to adopt these definitions to facilitate consistent understanding and application of this planning document which augments the body of knowledge associated with occupational safety and health.

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## **Executive Summary**

For the first time in the U.S. there is a formal research agenda for occupational safety and health for the agriculture, forestry and fishing (AgFF) industries. The National Occupational Research Agenda (NORA) plan is based on scientific evidence, public testimonies, peer reviews, and personal expertise.

The AgFF Sector includes activities such as growing crops, raising animals, harvesting timber, and harvesting fish and other animals from farms, ranches, or natural habitats. This plan includes a set of strategic and intermediate goals to focus research, intervention efforts and prioritization of safety and health issues to an audience which includes industry, labor, federal, state, and local governments, and subject matter experts. Considerations critical to the priority-setting process were: the numbers and proportions of workers at risk for a specific injury or illness; the seriousness or severity of the hazard or issue; and the probability that new information/approaches will improve worker safety or health.

This executive summary lists the nine strategic goals put forth by the Council. For each Strategic Goal, there are up to five intermediate goals, each of which has specific action steps.

### **STRATEGIC GOAL 1 - Surveillance**

*Improve surveillance within the 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.*

Because of the paucity of surveillance data in the AgFF subsectors, especially non-fatal injury data and the number and types of workers, enhanced surveillance is critical to addressing the other strategic goals. These data will define the specific populations at risk, the injuries and illnesses of greatest concern, and the impact/effectiveness of prevention efforts and intervention programs. A top priority is improved systems for collecting, analyzing and reporting data.

### **STRATEGIC GOAL 2 – Vulnerable Workers:**

*Reduce deleterious health and safety outcomes in workers more susceptible to injury or illness due to circumstances limiting options for safeguarding their own safety and health.*

Some workers experience disproportionate rates of occupational injuries and illnesses because of social or physiological factors which can lead to increased workplace exposures and/or individual susceptibilities. Low English literacy and proficiency may reduce the efficacy of training and risk communication programs; socioeconomic factors may lead some workers to accept and remain in higher risk jobs. These factors compromise workers' ability to seek protections and/or

access resources. The circumstances and characteristics leading to vulnerability include extremes in age (under 18 and over 65 years), gender, limited English language and literacy, mobility and migration, socioeconomic status, ethnicity, culture, documentation status, and physical or cognitive disability. A priority is to secure and share valid, timely data regarding characteristics of this workforce, then develop evidence-based interventions targeted for vulnerable workers.

***STRATEGIC GOAL 3 – Outreach, Partnerships, and Communications***

*Move proven health and safety strategies into workplaces through the development of partnerships and collaborative efforts.*

Outreach is necessary to effectively implement the strategic plan. Disseminating relevant interventions and promoting the adoption of best practices in the workplace to all those who have a stake in improving the health and safety of workers can be achieved most effectively through partnerships and collaborations. Best practices include, but are not limited to: new technologies and engineering controls; behavior change interventions; training; incentive programs; and guidelines and policy approaches. Strategies will highlight collaborations that yield effective adoption of best management practices across the agriculture, forestry and fishing industries.

***STRATEGIC GOAL 4 – Agriculture Safety***

*Reduce the number, rate, and severity of traumatic injuries and deaths involving hazards of production agriculture and support activities.*

Agricultural production is one of the most hazardous industry sectors in the U.S. Between 1992 and 2005 in the U.S., 7,571 farmers and farm workers died from injuries sustained while performing farm work in the U.S. Farm tractors accounted for the greatest portion of the fatalities (37%), predominantly caused by overturns (rollovers) and runovers. In addition to fatalities, an average of 93,000 non-fatal OSHA recordable injuries occur on U.S. farms each year. A top priority is adoption of interventions known to be effective in preventing tractor rollovers and runovers.

***STRATEGIC GOAL 5 – Agriculture Health***

*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 a wide range of acute and chronic health exposures at work. Their work can be strenuous, involving long hours, difficult conditions and repetitive exposure to musculoskeletal strains and sprains, respiratory hazards, toxic chemicals, psychological stresses and a variety of zoonotic diseases. These longstanding problems persist and there are emerging situations associated with new production methods, environmental issues, technologies

and changing demographics of the workforce. Among the many concerns, a priority is to reduce the incidence and prevalence of musculoskeletal disorders.

**STRATEGIC GOAL 6 – Forestry Safety**

*Reduce the number, rate and severity of traumatic injuries and deaths involving hazards of forestry.*

In order to develop performance measures and track improvements in safety and health working conditions, comprehensive baseline data are needed. Different federal agencies monitor aspects of forestry workers, products, and occupational fatalities. Determining the specific cause of an injury event is often not possible because of lack of detailed data. This sector warrants considerable attention in building capacity to implement evidence-based safety interventions, starting with improved surveillance of workers and their exposures.

**STRATEGIC GOAL 7 – Forestry Health**

*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 strenuous jobs they perform over long work shifts. Musculoskeletal disorders and occupational illnesses can shorten working lives. Exposures to hazards and toxic materials, availability of protective clothing and equipment, and drug and alcohol use are major concerns for the forestry workforce. In addition, the health status of these workers has likely changed with mechanization. A key area for action will be interventions to minimize work-related musculoskeletal disorders.

**STRATEGIC GOAL 8 – Fishing Safety**

*Reduce the number, rate and severity of traumatic injuries (including deaths) involving hazards of commercial fishing.*

Commercial fishing remains one of our nation's most hazardous occupations. Despite increased regulations in 1988, commercial fishermen are about 30 times more likely to die pursuing their occupation than the average worker. The impact of the high rate of death and injury is devastating to fishing communities and fishermen's families. To exacerbate the situation, some of the industry is overcapitalized and competition for a tightly controlled resource adds competitive pressure to support risk taking. A priority is to adopt interventions that reduce deaths associated with vessel sinking and falls overboard.

**STRATEGIC GOAL 9 – Fishing Health**

*Improve the health of commercial fishermen by reducing occupational causes or contributing factors to illness and disease.*

Commercial fishing workers face many acute and chronic health exposures at work but little research has been done on these health issues or their prevention. There is also no surveillance or required reporting of health hazards for

commercial fishing. As with agriculture and forestry, reduction of work-related musculoskeletal disorders is a top priority.

Note: The AgFF Strategic Plan includes a dictionary intended to standardize terminology used by safety and health professionals to describe and report occupational hazards, risks, injury, disease and illness used in occupational safety and health research.

NORA AgFF Strategic Plan Authors: A list of the AgFF Sector Council members is available on the NORA website (<http://www.cdc.gov/niosh/nora/councils/agff/planpart.html>).



## **Introduction**

### **What is the National Occupational Research Agenda?**

The National Occupational Research Agenda (NORA) is a partnership program developed to stimulate new knowledge, innovative research, and improved workplace safety and health practices. Unveiled in 1996, NORA has provided 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 from government, academia, industry, and labor work together to identify critical issues in workplace safety and health and develop goals and objectives for addressing them, creating a national agenda. The Agenda will provide guidance to the entire occupational safety and health community for research prioritization, moving research into workplace practice, evaluation, and developing long-term surveillance. The following types of information inform the priority-setting process:

- The numbers and proportions of workers at risk for a particular injury or illness
- The seriousness or severity of the hazard or issue
- The probability that new information and approaches will improve worker safety or health.

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's 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>.

### **What is the role of the NORA Sector Councils?**

For manageability, NIOSH has aggregated industries into eight major sector groups (listed below) and with its partners, has formed eight corresponding NORA Sector Councils to develop and promote implementation of the National Occupational Research Agenda. In addition, a Cross-Sector Research Council will promote coordination across NORA Sector Councils, for example, identify opportunities for common research across sectors.

<b><u>NORA Sector Group</u></b>	<b><u>NAICS Code</u></b>
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.

Each Sector Council is tasked with identifying the most prominent safety and health needs of its sector and developing a strategic plan—the sector’s contribution to the national Agenda—to address those needs. The strategic plans seek to highlight the most important research questions, recognize priority safety and health concerns, understand the most effective intervention strategies, and disseminate information on ways to implement those strategies to achieve sustained improvements in workplace safety and health practice. Implementation plans for the nation will then be developed based on the sector strategic plans.

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

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 natural habitats (North American Industry Classification System, United States 2002; Executive Office of the President OMB, 2002).

The AgFF Sector Council has crafted a set of goals, action steps, and performance measures that comprise this sector’s contribution to the National Occupational Research Agenda. These goals will be used as a written strategic plan to focus research and intervention efforts. To begin addressing the priorities outlined in the agenda, the AgFF Sector Council will identify available funding, stakeholders, and other potential partners interested in providing research resources (e.g., data, staffing) and expertise or who are participating in research to practice activities. A current list of the AgFF Sector Council members, partners and their affiliations is available on the NORA website (<http://www.cdc.gov/niosh/nora/councils/agff/planpart.html>).

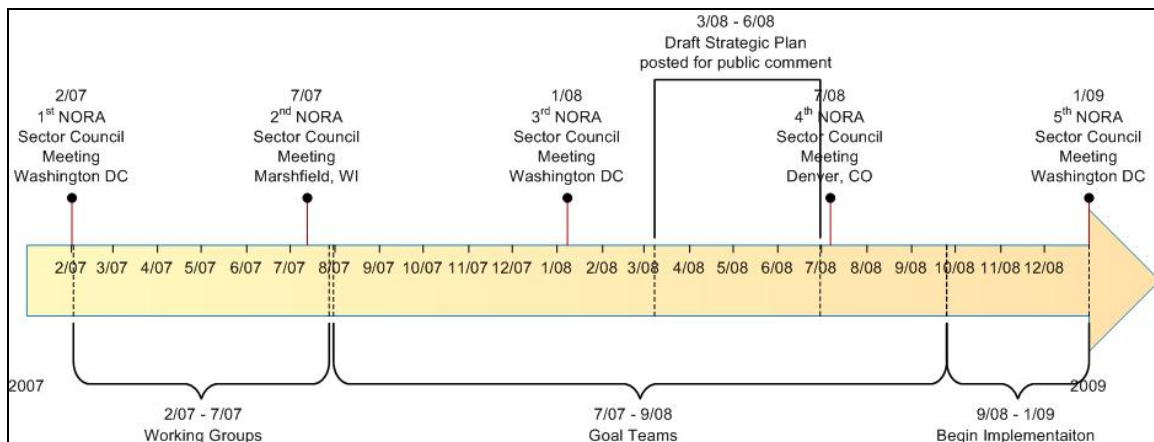
**Who is the target audience?**

The NORA AgFF Strategic Plan provides guidance on prioritization of safety and health issues to industry, labor, federal, state, and local governments, as well as to 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 was used to develop the goals for the NORA AgFF Strategic Plan?**

From December 2005 through December 2006, NIOSH and other NORA partners gathered with stakeholders to discuss regional and sector-specific safety and health issues at 13 town hall meetings held throughout the United States. These meetings were intended to gain initial public input on occupational health and safety concerns to guide the development of the national agenda. The meetings were held in twelve states and one territory, and half of the 1000 participants offered their thoughts on which diseases, injuries, exposures, and 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 eight Sector Councils were formed. The diagram below illustrates the timeline showing progress of the AgFF Sector Council.



The first AgFF Sector Council meeting was held in February 2007. Priorities were determined based on available surveillance information, council member expertise, and comments from the town hall meetings. Members were divided

into “working groups” (Surveillance; Vulnerable Populations; Outreach; Agriculture; Forestry; and Fishing) to determine specific areas of interest for each priority. At the July 2007 meeting, the Council decided that Agriculture, Forestry, and Fishing should each be divided into separate Health and Safety emphasis areas. Council members were reassigned to nine “Goal Teams” and each team was asked to determine one overarching Strategic Goal for one of the following topics:

- Surveillance
- Vulnerable workers
- Outreach, Partnerships, and Communications
- Agriculture safety
- Agriculture health
- Forestry safety
- Forestry health
- Commercial fishing safety
- Commercial fishing health

The Goal Teams were also tasked with developing Intermediate Goals, and corresponding Action Steps to support the Strategic Goals and determine implementation strategies. The Goals and Action Steps were reviewed by the Sector Council at the January 2008 meeting, with the additional instruction to prioritize them.

Throughout this process, the availability of multiple means of communication (in-person meetings, teleconferences, and e-mail) have enabled 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 a concern about the inclusion of bystanders: people who are not workers, but are family members or others in the physical vicinity of work operations who could be injured due to conditions or exposures in the work setting. 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.

A draft strategic plan was posted for public comment in March 2008. During the July 2008 meeting the strategic plan was finalized and discussion began on potential partners for implementation of the strategic plan.

The AgFF Sector Council Strategic Plan is a dynamic living document. The contents of this document will continue to be considered and revised as additional research is completed, comments are received, and 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) is included in the Preface, and can be found at

<http://www.cdc.gov/niosh/nora/councils/agff/planpart.html>.

There are several 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 join later as full Council members when openings arise. Contact the Sector Coordinator Brad Husberg ([BHusberg@cdc.gov](mailto: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 strategic plan, participating in research, translating research findings into Sector-appropriate information products, implementing research results and recommendations, and disseminating information and practices. 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](mailto:BHusberg@cdc.gov).

## **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 which 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 currently 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, but these advances have not been extended to cover other illnesses or farm populations [NIOSH, 2006; NIOSH, 2008]. 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 accessible to those who need the data to take preventive 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 preventive 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

Personal 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 - 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 1.1.2 - 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 1.1.3 - 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 1.1.4 - Assess the available surveillance for all sub-sectors of the AgFF sector and identify gaps in the existing systems. Target: 2010.

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: initiate in 2010 (ongoing).

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: initiate in 2010 (ongoing).

Action Step 1.1.7 - Develop coding software to assign occupation and industry codes to public health data sources that contain occupation and industry narratives. Target: initiate in 2010 (ongoing).

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 U.S. Target: 2011.

Action Step 1.1.9 - 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: 2012.

Action Step 1.1.10 - Incorporate variables into existing or new surveillance systems to facilitate the identification of vulnerable worker populations. Target: initiate in 2012 (ongoing).

Action Step 1.1.11 - Improve comparability of research data over time by encouraging researchers to utilize terms and definitions from the “Dictionary of Terms for Agricultural Safety & Health Professionals” (Appendix 2) in their surveillance systems. Target: initiate in 2012 (ongoing).

Action Step 1.1.12 - Encourage utilization of the preferred categorical variables from the Dictionary of Terms for Agricultural Safety & Health Professionals in new surveillance systems. Target: initiate in 2012 (ongoing).

Action Step 1.1.13 - Examine new occupational injury, illness, hazard, and exposure data collection approaches (include pilot testing and evaluation) and implement those that are shown to be effective in filling data gaps. Approaches may include medical surveillance methods, case-based surveillance methods, physician reporting methods, worksite assessment methods, or other methodologies. Priority should be given to occupational illnesses (e.g., musculoskeletal conditions, hearing loss, respiratory diseases, and zoonoses), hazard assessments, and exposure assessments. Target: initiate in 2012 (ongoing).

**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. Demographic data systems will need to be improved to provide accurate workforce estimates for specific racial and ethnic groups, and employment status of workers (e.g., self-employed, hired, contractor, day laborer, temporary workers).

Action Step 1.2.1 - 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 1.2.2 - 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: initiate in 2010 (ongoing).

Action Step 1.2.3 - 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: initiate in 2010 (ongoing).

Action Step 1.2.4 - 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 U.S., and the percentage that are undocumented. Target: initiate in 2010 (ongoing).

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: initiate in 2010 (ongoing).

Action Step 1.2.6 - Work with USDOL-ETA to include livestock operations in the NAWS. Target: initiate in 2010 (ongoing).

Action Step 1.2.7 - 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: initiate in 2010 (ongoing).

Action Step 1.2.8 - Incorporate variables into existing or new demographic data collection systems to facilitate the identification of vulnerable worker populations. Target: initiate in 2012 (ongoing).

Action Step 1.2.9 - 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: initiate in 2012 (ongoing).

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: initiate in 2012 (ongoing).

**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 - 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 U.S. Target: West Coast, 2007; East Coast, 2008; Gulf of Mexico, 2009.

Action Step 1.3.2 - Work with USDA-NASS to release preliminary results of all NIOSH-sponsored surveys within nine months of completing data collection. Target: 2009.

Action Step 1.3.3 - Provide summary results from NIOSH-sponsored surveys conduct by USDA-NASS within 12 months of USDA-NASS completing data collection. Target: 2009.

Action Step 1.3.4 - Work with USDA-NASS to make public use data sets available for all NIOSH-sponsored surveys within nine months of completing data collection. Target: 2009.

Action Step 1.3.5 - Work with BLS to release detailed results from the Census of Fatal Occupational Injuries (CFOI) for the AgFF sectors within six months of the initial release of CFOI data by BLS. Target: initiate in 2010 (ongoing).

Action Step 1.3.6 - Work with USDOL, ETA to release initial NAWS results within one year of collection of the data. Target: initiate in 2010 (ongoing).

Action Step 1.3.7 - Work with BLS to better market their services for filling special data requests from their CFOI, Survey of Occupational Injury and Illness (SOII), and employment data sets. Target: initiate in 2010 (ongoing).

## References

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## **STRATEGIC GOAL 2 – Vulnerable Workers**

### **2. Strategic Goal: Reduce deleterious health and safety outcomes in workers more susceptible to injury or illness due to circumstances limiting options for safeguarding their own safety and health.**

#### *Background*

Some workers experience disproportionate rates of occupational injuries and illnesses within the AgFF Sector because of social or physiological factors which can lead to increased workplace exposures and/or individual susceptibilities.

#### *Social factors*

Low English proficiency and literacy may decrease the efficacy of training and risk communication programs; socioeconomic factors may lead some workers to accept and remain in higher risk jobs. These social factors also compromise workers' ability to seek protections and/or access resources that others employed in this sector access. Temporary or seasonal nature of employment requires some workers to change jobs and even relocate for work.

#### *Physiologic factors*

Workers may start work at a younger age due to family connections or economic necessity, before they are physically or mentally prepared for hazardous work. On the other hand, they may continue to work in spite of physical or mental limitations accumulated over time which may accelerate the onset of disabilities.

Examples of AgFF Sector worker populations that may be considered vulnerable because of these social and physiologic factors include: recent immigrants and Latino workers, young workers, older workers, physically- or cognitively disabled workers, and unpaid family workers.

For many workers, vulnerability is multi-factorial and may change during the worker's career. Appropriate interventions and remedies require an understanding of the factors that increase and reduce vulnerability of workers in the AgFF Sector.

#### *Recent Immigrant and Latino Workers*

Recent immigrants may have multiple factors contributing to their vulnerability, such as limited English, low literacy, low socioeconomic status (SES), lack of social support networks, and dire economic need. Foreign-born workers make up a large proportion of the AgFF workforce. Workers with undocumented immigration status, primarily from Latin American countries, make up one-third of the foreign-born labor force [Kochhar, 2008].

Demographic data are difficult to obtain for the forestry workforce (see Appendix 1), but it is estimated to be heavily dependant on Latinos, Southeast Asians and Eastern Europeans. Among agricultural workers, approximately 80% are foreign

born, more than half are undocumented, and 87% are Latino, predominantly Mexican [Steege and Baron, 2007]. Latino AgFF workers have experienced elevated and increasing occupational fatality rates every year since 1992. The Medical Expenditure Panel Survey found that Latinos experience higher rates of non-fatal lost-work-time injuries than other AgFF workforce segments.

Their economic situation, the seasonal nature of much of the work, and the contingent work status of most Latino AgFF workers force many of them to change occupations within the sector (mobility) and to physically relocate themselves and their families (migration). These circumstances also make them less likely to challenge or to walk away from unsafe working conditions, the risks of which are compounded by their lower rates of health insurance coverage.

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

#### *Young Workers*

Work tradition, economic need, and other circumstances lead to children working in family or community businesses. More than one million youth lived on farms in 2006 and more than half of them performed work or chores on the farm [NIOSH, 2007; NIOSH, 2004]. Hired workers younger than 18 years made up approximately 3% of the crop production workforce in 2003-2004 [Steege, 2008]. For workers under 18 years of age, the AgFF industries have increased rates of fatal traumatic injuries compared to that of all industries [Hard and Myers, 2006]. The physical and cognitive development and lack of experience of young workers make them more vulnerable to work-related injuries than their adult counterparts.

#### *Older Workers*

Thirty percent of the farming workforce is older than 55 years, and the proportion continues to rise [Meyer, 2005]. Farmers may work beyond their safety limits because there is no mandatory retirement. As visual acuity declines with age, older farmers are prone to injury because they may routinely work in situations with inadequate light [Farm Safety Association, 2002]. Additionally, senior farmers experiencing loss of sense of balance and bouts of dizziness are at increased risk of injury [Peters, 2007]. Though demographic data are scarce for the fishing and forestry sub-sectors, it is probable that they, too, are “graying”.

“Fatal occupational injury rates are higher in the agriculture, forestry, and fishing sector than the private sector for every age group. The rates ranged from 13.7/100,000 for workers aged 16-24 to 62.0 for workers older than 64.” [BLS, 2003].

*Physically- and Cognitively-disabled Workers*

Physically- and cognitively-disabled 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. “Approximately one in five of the farm and ranch population have a disability that restricts daily living or hinders completion of essential work-related tasks” [Field, 2007]. The disabilities most frequently reported among these workers are musculoskeletal disorders, hearing impairment, cardiovascular diseases, and respiratory impairment [Field, 2007].

*Unpaid Family Workers*

Work traditions and economic need can lead to family members of all ages working without pay for family or community businesses. The Trades Union Congress Commission on Vulnerable Employment describes the risk inherent in being an unpaid family worker:

“... Unpaid family workers are people ... undertaking unpaid work for a business they own or for a business that a relative owns. ... Not receiving a wage puts people at greater risk of exploitation – primarily because they have no agreed terms and conditions and are not entitled to even the most basic of legal employment protections” [Trades Union Congress Commission on Vulnerable Employment, 2007].

While it is suggested that unpaid family workers are more prevalent in agriculture, employment on small fishing vessels does not require the contract protections seen on larger vessels. The forestry industry has little documentation on this category of vulnerable workers.

*The 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, SES, documentation status, ethnicity, culture, and physical or cognitive disability.*

**Intermediate Goal 2.1 – Define and identify "vulnerable workers" in each sector- agriculture, forestry and fishing**

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

Because of the range of characteristics that can lead to vulnerability, it is a challenge to define each condition in a way that allows measurement in the target population. Such definitions are necessary to allow comparison of survey data between sectors, industries, or population groups.

Action Step 2.1.1 - Draft surveillance definition for vulnerable persons and/or those suffering health inequalities. Target: 2009.

Action Step 2.1.2 - Enumerate vulnerable workers by location and characteristics to establish a baseline for identifying negative health outcomes in vulnerable workers. Target: 2011.

**Intermediate Goal 2.2 Identify the deleterious health and safety outcomes of vulnerable workers in each sector- agriculture, forestry and fishing.**

With the vulnerable worker population defined, the next step is to acquire data on their health outcomes. This will establish the level of health and safety risks for this population and allow comparisons to other AgFF worker populations to ascertain any increase in risk for vulnerable workers.

Action Step 2.2.1 - 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: 2011.

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

Action Step 2.2.2 - Identify patterns and trends of excess morbidity and mortality for vulnerable workers. Target: 2013

**Intermediate Goal 2.3 - Improve data collection and existing databases to provide information on safety and health disparities among vulnerable workers.**

Although preliminary data are often informative, they are rarely comprehensive. Continuing effort should be made to acquire other data sources and refine the characteristics of the parameters used, to better identify the vulnerable worker population. Characteristics of the target population's activities and lifestyle, such as mobility and migration, must be taken into consideration when locating additional data sources and determining outcome rates. Continual improvement should be made in data collection methods to expedite the process and ensure the most complete data sets achievable.

Action Step 2.3.1 - Seek new data collection mechanisms where gaps exist. Target: 2010.

Action Step 2.3.2 - Incorporate variables into existing or new surveillance systems to facilitate the identification of vulnerable worker populations. Target: 2012.

Action Step 2.3.3 - Establish data-sharing mechanisms among universities, government agencies, and community-based and non-governmental organizations. Target: 2018.

Action Step 2.3.4 - Develop methods to track workers who are mobile geographically or across industries to be able to assess long-term health effects. Target: 2018.

**Intermediate Goal 2.4 - Use innovative and proven communication, education, training, and marketing techniques to tailor workplace safety and health programs to be responsive to the unique needs of vulnerable workers.**

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

Once the risks are determined, the data must be used to advise the stakeholders: clinicians, healthcare facilities, employers, worker support agencies, and the vulnerable workers themselves. The information should be communicated in a timely manner, before the affected population is no longer accessible or conditions change. Any information describing the risks, how to avoid or prevent them, and what action to take when exposed to a hazard, should be provided in a language, literacy level, and medium (e.g., radio) that is accessible to the target audience. Developing partnerships and continued collaboration with industry and government agencies and other stakeholders could ensure improved development and dissemination of materials and program interventions.

Action Step 2.4.1 – Ensure that the needs of vulnerable workers are included in yearly listings of proven interventions, per Action Step 3.3.2, including reading levels, translation, language, and responsiveness to needs. Target: Initiate in 2011 (ongoing annually).

Action Step 2.4.2 – Determine effectiveness of existing interventions and educational materials that are tailored to address unique factors associated with vulnerability. Target: 2011.

Action Step 2.4.3 – Facilitate the development and evaluation of high quality and appropriate materials where gaps exist. Target: Initiate in 2011 (ongoing annually).

Action Step 2.4.4 – Where gaps exist, conduct demonstration programs in conjunction with employers hiring vulnerable workers, to identify new, cost-effective approaches for safety training and work production. Target: 2013.

Action Step 2.4.5 – Facilitate implementation of effective health and safety interventions tailored to address risk factors associated with vulnerability, through partnerships with industry leaders in agriculture, forestry and fishing. Target: 2013.



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### **STRATEGIC GOAL 3 – Outreach, Communications and Partnerships**

#### **3. Strategic Goal: Move proven health and safety strategies into agricultural, forestry and fishing workplaces through the development of partnerships and collaborative efforts.**

This goal sets out a course of action to disseminate evidence-based strategies to all those who have a stake in improving the health and safety of workers in the agriculture, forestry and fishing industries. Outreach is a necessary step to effectively implement the full NORA AgFF plan. Disseminating relevant interventions and promoting the adoption of best practices in the workplace can be best achieved through partnerships and collaborations. Proven approaches to worker health and safety for each of the sector industries should be identified and a wide variety of outreach methods applied to assure that optimal health and safety is achieved. These best practices include, but are not limited to: new technologies and engineering controls; behavior change interventions; training; incentive programs; and guidelines and policy approaches.

**Intermediate Goal 3.1 - Form collaborative efforts with key stakeholders to: 1) biennially assess current and emerging major occupational health and safety concerns and solutions; and 2) prioritize interventions for implementation.**

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 broad-based support for the adoption of best practices is to have a strong group of stakeholders involved. These stakeholders must be encouraged to communicate their needs as well as be committed to promoting the adoption of the latest and best safety and health methods available to the agriculture, forestry and fishing industries.

Action Step 3.1.1 – Identify stakeholders and ensure they are aware of the NORA AgFF purpose and plan. Stakeholders should include: policy makers, federal and state agencies, safety and health researchers and practitioners, agribusiness, agricultural producers, union representatives, farm labor contractors, farm worker representatives, commercial fishermen, extension forestry services, youth-serving groups, community-based organizations, and national level coalitions (e.g., Agricultural Safety and Health Council of America). Target: 2009

Action Step 3.1.2 – With partners, prioritize interventions for implementation in the agriculture, forestry and fishing industries. Target: Initiate in 2008 (ongoing, every two years).

Action Step 3.1.3 – Convene a biennial national state-of-the-science conference on agriculture, forestry, and fishing safety and health resources, interventions, program needs, and training issues. Use this conference to facilitate networking, program implementation, and improved training among a wide range of collaborators. Target: Initiate in 2010 (ongoing, every two years).

**Intermediate Goal 3.2 - Identify practical and proven occupational safety and health interventions, then encourage new studies to meet needs where proven strategies do not exist.**

It is critical that the best practices in agriculture, forestry, and fishing be identified and reassessed on a regular basis. Such best practices may include methods developed in the U.S. as well as by comparable industries in other countries.

Action Step 3.2.1 – Determine best methods to influence the behaviors of agricultural workers, loggers and commercial fishermen. Methods should account for social, economic, cultural, and other factors affecting the adoption of best practices among workers and employers. Assessments of barriers, motivators and ideal strategies should be undertaken by NIOSH Agricultural Research Centers, USDA, Cooperative Extension services, universities and other partners with expertise to conduct relevant, valid studies. Target: Initiate in 2010 (ongoing).

Action Step 3.2.2 – Document and report proven interventions. Determine how and where a list and description of proven strategies should be maintained for easy access by stakeholders in the AgFF industries. The NIOSH Agricultural Research Centers should participate in this process to identify strategies of national as well as regional relevance. Target: Initiate in 2011 (ongoing, every two years).

Action Step 3.2.3 - Identify gaps in health and safety best practices and methods. Encourage and facilitate studies and programs to meet industry needs for improved safety, including engineering, information technology, and policy approaches. Target: 2011.

**Intermediate Goal 3.3 - Use innovative and proven communication, education, and social marketing techniques to influence knowledge, attitudes and practices of agricultural workers, loggers and commercial fishermen.**

As best practices are identified, it will be crucial that they be implemented as rapidly and thoroughly as possible in order to improve the health and safety of the target groups in each industry. 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 as a result of a single input of information. Research has shown that education alone is not sufficient for preventing injuries or changing behaviors. The panoply of techniques known to influence positive behaviors and reduce hazards in the work setting must be used.

Action Step 3.3.1 – Facilitate implementation of evidence-based programs that are culturally, linguistically, and educationally appropriate for workers and employers. Target: Initiate in 2009 (ongoing).

Action Step 3.3.2 – Increase awareness and promote expanded application of best practices, materials, technologies, and policies via partners such as producer organizations, health and safety practitioners, regulatory personnel, vocational teachers, extension agents, insurers, clinicians, and others in positions to influence adoption of best practices. Target: Initiate in 2009 (ongoing).

Action Step 3.3.3 - Facilitate the development of public awareness and social marketing campaigns regarding high priority agriculture, forestry and fishing safety and health issues. Target: Initiate in 2010 (ongoing).

Action Step 3.3.4 – Encourage and promote proven outreach initiatives targeted for high risk populations, including children and bystanders in the work setting. Target: Initiate in 2010 (ongoing).

**Intermediate Goal 3.4 - Use innovative educational techniques and certification programs to improve the safety practices of agricultural workers, loggers and commercial fishermen.**

Developing and promoting best practices in the workplace may be enhanced through training and certification programs. Proven approaches to worker health and safety for each of the sector industries are more likely to be developed, tested and implemented if accessible, affordable, and high quality training (including certification programs) is available for the industries of agriculture, forestry and fishing.

Certification programs that currently exist provide examples, such as: a) tractor and equipment operation, including power take-offs (PTO's), guards, and shields for 14-15 year olds under the Hazardous Occupation Safety Training in Agriculture (HOSTA) program at USDA; and b) pesticide handling training for farm workers and handlers under EPA's Worker Protection Standard. Examples of modules in forestry and logging that could be developed for certification may include: a) felling and bucking (cross cutting) timber; b) machine operator training, e.g., log loader operation; and c) mechanized operator training - harvester and forwarder. Training modules in commercial fishing for potential

development and certification could include: a) surviving vessel sinking; and b) falls overboard and slipping prevention.

Action Step 3.4.1 – Assess current, and develop additional, training programs (including train-the-trainer programs), materials, incentives, and methods; regularly update training materials and programs to be culturally, linguistically, and educationally appropriate. Training should provide options for AgFF employers and employees, health and safety practitioners, regulatory personnel, vocational teachers, extension agents and others. Target: 2011.

Action Step 3.4.2 - Promote and facilitate worker safety and health training at agriculture, forestry and fishing industry/association regional events and national conferences. Target: Ongoing annually.

Action Step 3.4.3 – Provide occupational safety and health content and recommendations for graduate level curricula (e.g., for USDA graduate school courses) related to production and management training programs in agriculture, forestry and fishing held across the U.S. Target: 2011.

Action Step 3.4.4 – Develop nationally recognized certification programs for occupational safety training and health protection for agriculture, forestry and fishing workers. Provide certified training suitable for workers who may or may not have enrolled in vocational agriculture classes at the high school level. Target: 2013.

Action Step 3.4.5 – Annually assess the training programs, materials, and methods; update and modify them based on injury surveillance data and participant impact measures. Target: Initiate in 2015 (ongoing annually).

## **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 et al., 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 et al., 2007a]. Tractors and farm machinery were identified as the leading cause of death for youths less than 16 years of age on farms [Goldcamp et al., 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.

The National Occupational Research Agenda process was charged with addressing issues pertinent to workers. Yet, in agriculture, many farm-related injuries and diseases affect non-workers, especially children who live on or visit farms. With a federal mandate, NIOSH accepted a lead federal agency role for addressing childhood agricultural injuries in 1996. A national action plan, endorsed by 80 national-level organizations, set forth detailed goals and recommended actions [NCCAIP, 1996]. Five years later, an in-depth assessment was conducted and reviewed during a 2001 Summit on Childhood Agricultural Injury Prevention [Lee, Gallagher, Marlenga, and Hard, 2002]. These action plans and related activities address both working and non-working youth and were acknowledged by the NORA AgFF Sector Council as related to the plan that follows. Therefore, specific attention is not accorded in this goal section to concerns of non-working children.

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

**Intermediate Goal 4.1 - Reduce the number of fatalities due to overturns of tractors in agriculture 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 about half 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 farmers 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; Springfield et al., 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; Springfield et al., 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 et al., 2006; Loring, 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 et al., 2006; Loring, 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 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.

Action Step 4.1.4 - Partnership groups and coalitions, essential to preventing tractor-related injuries and deaths, should be formed in each region or state to influence adoption of proven interventions (e.g., engineering, incentives, and policies). Partners should include, among others, government agencies, employer associations, labor representatives, tractor manufacturers, family farm representatives, farm cooperatives, insurance companies, universities, and NIOSH Agricultural Research Centers.

**Intermediate Goal 4.2 - Reduce the 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 run over 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 et al., 2007b; BLS, 2008]. Youths less than 16 years old, and especially those less than 5 years old, are at high risk for being run over by tractors and other mobile farm equipment [Goldcamp et al., 2004].

Operators and others, including persons providing support services, can be run over by agricultural field or farmstead equipment. Equipment operators, for example, can be run over 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 run over 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.

Extra riders, including 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, extra riders 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 run over 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 run over by the tractor or the implement. An unsuspecting bystander of any age could be run over 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 run over by field or farmstead equipment. Efforts should be made to 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.

Action Step 4.2.2 - Identify runover-related problems addressable by technical solutions; evaluate studies associated with current runover prevention intervention technologies and develop improved 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 three priority runover-related problems requiring engineering solution(s) by 2010.

Action Step 4.2.3 - 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.

Action Step 4.2.4 - Evaluate the effectiveness of existing runover prevention intervention measures (including barriers, obstacles, and incentives) in use by production agriculture and support activity workers (e.g., equipment dealers); then 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 through relevant partnerships.

Performance Measure (1): Increase translation into practice of three existing engineering approaches and five educational training, or other runover prevention intervention measures by 2011.

Performance Measure (2): Increase awareness of runover hazards and effective prevention intervention measures among 10% of farmers, ranchers, and farmworkers by 33% over a baseline year by 2013.

Action Step 4.2.5 - Document and report the effectiveness of engineering, educational training, and other runover prevention intervention measures translated into practice. Target: 2016.

Action Step 4.2.6 – Based on evaluation results and injury/fatality surveillance data, 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.

Action Step 4.2.7- Respond to the unique needs of an increasingly diverse workforce, not limited to accommodating persons with disabilities (hearing impairment, physical limitations, or otherwise), in terms of runover prevention strategies.

**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 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 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 – Using available data, identify and report fatality trends and keystone issues, e.g., entanglements, operations (dropping, raising, swinging), electrocutions, slips, trips, falls, and collisions, associated with equipment-related deaths. Target: Initiate in 2010 (ongoing).

Action Step 4.3.2 - Enhance/expand safety interventions with farmers and farm families, including resources such as safety videos, hazard identification kits, and best practices guidelines, to be distributed by partner organizations. Incorporate information regarding economic issues/benefits of maintaining a safe working environment (lost family income, medical costs, lawsuits and legal issues, and tax benefits). Target: 2010.

Action Step 4.3.3 – Conduct studies to determine the most cost-effective and practical strategies for eliminating fatalities, including engineering design (e.g., sensors), information technology (e.g., GPS), incentive programs, and guidelines or policies. Target: 2012.

Action Step 4.3.4 – With partners in agricultural production and support activities, promote and implement those interventions deemed most effective in eliminating fatalities. Target: 2014.

**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 estimates 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, and combines) and industrial vehicles (e.g., farm tractors and forklifts) accounted for 12% of these injuries [NIOSH, 2008]. Machinery accounted for 7,400 injuries while industrial vehicles caused 4,000 injuries. For machinery-related injuries, the highest portion (38%) involved the victim getting caught in running equipment, followed by being struck by the machine or parts of the machine (26%). 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%). However, workers over the age of 54 years accounted for 45% of industrial vehicle injuries. 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 – Improve surveillance options for tracking non-fatal injuries; then regularly identify trends and keystone issues based on surveillance data. Maintain strong working relationships with Occupational Safety and Health Administration and state plans to expand monitoring programs and investigate workplaces with high injury rates.

Action Step 4.4.2 – Assess existing educational materials for accuracy, relevance and usability for target audiences. Ensure educational materials incorporate economic issues/benefits of maintaining a safe working environment (lost family income, medical costs, lawsuits and legal issues, and tax benefits) and proven strategies for the most common equipment-related injuries. Facilitate dissemination of these materials through partner organizations and various distribution mechanisms (refer to Strategic Goal 3).

Action Step 4.4.3 – Conduct research to identify innovative strategies, other than traditional educational approaches, for reducing the rate of non-fatal equipment-related injuries. Interventions to be tested should address engineering design, information technology, incentive programs, and policies. Target: 2012.

**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 associated with highway transportation events (743 deaths), working surfaces associated with falls (345 deaths), animals (317 deaths), and ammunition associated with assaults and self-inflicted injuries (249 deaths) [BLS, 2008]. Farmers and farm workers over the age of 54 years account for approximately 63% of the animal-related deaths reported in agriculture [Hard et al., 2002; BLS, 2008]. For the annual 93,000 non-fatal OSHA recordable injuries that occur on farms, an average estimated by NIOSH, the most common sources of injury were identified as working surfaces associated with falls (22%), animals (19%), and hand tools (8%) [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 effective strategies that could prevent these injuries.

Action Step 4.5.3 - Work with USDA, NIOSH, the Agricultural Safety and Health Council of America (ASHCA) ([www.ashca.org](http://www.ashca.org)), 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 the NIOSH Agricultural Research Centers, Cooperative Extension safety specialists, Farm Bureau safety leaders, and others to identify effective, research-based intervention 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 Agricultural Research Centers, Cooperative Extension safety specialists, Farm Bureau safety leaders, producer organizations, and others to promote and implement safety education, intervention programs, and recommended guidelines/policies for non-fatal work-related injury (refer to Strategic Goal 3).

Action Step 4.5.6 - Work with ASHCA, major farm organizations, agribusiness and the farm media to influence farmers' and the public perspectives on the value of working to better manage hazards and risks among workers and bystanders in agricultural occupational settings (refer to Strategic Goal 3).

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. Many of the salient issues, clearly identified in the groundbreaking report, “Agriculture at Risk: A Report to the Nation (1989)” remain a concern [Merchant et al., 1989]. Additionally, emerging concerns associated with new production methods, environmental issues, technologies and changing demographics of the workforce warrant attention.

With respect to limitations in agricultural occupational surveillance data, the 1989 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 et al., 1989]. The data collection challenge remains a problem and is addressed throughout this document.

*Note: For Goal 5, target dates were excluded because baseline data from which to measure change are not yet available.*

Action Step 5.0 – Develop, test and continually improve surveillance systems to document incidence and prevalence of disease outcomes associated with agricultural work.

The five intermediate goals which follow are not meant to be all inclusive but represent recommendations of the Council regarding priority issues.

<b>Intermediate Goal 5.1 - Reduce the incidence and prevalence of musculoskeletal disorders (MSD) associated with work practices and production agriculture.</b>
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Among available general industry data sources (BLS, 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 and Myers, 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, for example the nursery and wine industries, but significantly more is needed [Janowitz et al., 1998; Meyers et al., 2006].

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, test, and widely promote best practice models and guidelines 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 - Continue research into and development and validation of MSD exposure assessment tools as well as the etiology of MSD's.

Action Step 5.1.6 - Improve utilization of the NIOSH Agricultural Research Centers, Education and Research Centers (ERCs) and other partners to address regional work and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research and program interventions.

**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 interstitium. In addition, exposures to biologic agents (bacteria, mycobacterium, viruses, and 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 et al., 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 farm workers than in the general population. A challenge to reducing respiratory disease in agriculture is that farmers do not believe their risk to be increased and use of respiratory protection is limited [Schenker et al., 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 has a greater risk for dust-induced airflow obstruction and restrictive lung disease. Some respiratory diseases such as tuberculosis may be increased among immigrant farm workers, but dissemination may be associated with agricultural practices and/or housing conditions [Ciesielski et al., 1991].

Action Step 5.2.1 - Provide outreach and education to employers and the employees on the hazards to which they could be exposed and proven strategies and 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 the synergistic affect of occupational and non-occupational risk factors.

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 and ERCs to address regional work and environmental hazards that cause 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 in. 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 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 some 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 [Alavanja et al., 2004; Kirkhorn and Schenker, 2002; Richter and Chlamtac, 2002; Dich et al., 1997; Zahm et al., 1997; Maroni and Fait, 1993]. 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 polymorphisms, 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 [Iyer, 2001]. 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. Finally, as the working population ages attention will need to be focused to better understand how agro-chemical exposures might interact with the prescription drug intake of older workers. These workers may also experience different recovery responses to acute or chronic exposures.

Exposure monitoring, pesticide poisoning surveillance, and epidemiological studies have been used to varying degrees to describe the extent of pesticide

exposure, morbidity, and mortality, primarily in agriculture [Curwin et al, 2005b; Alavanja et al., 2004; Hines et al., 2003; Kirkhorn and Schenker, 2002]. 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 AgFF 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 [Curwin et al., 2005, 2007; Bradman et al., 1997; Fenske et al., 2000; Loewenherz et al., 1997; Simcox et al., 1995]. 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 AgFF populations, research to evaluate interventions for reducing exposure will be needed. These interventions might focus on equipment modifications, work practice changes, PPE use, hygiene practices, culturally- and language-appropriate training and education materials, and risk perceptions.

Action Step 5.3.1 – Improve the organization of existing information. Based on an evaluation of findings, develop and implement biological monitoring guidelines, e.g., cholinesterase testing.

Action Step 5.3.2 - Develop and 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 related to protection from chemical exposures.

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 Research Centers, ERCs, and other partners to address regional work and environmental hazards that causes unique illness and disease conditions that can be rectified in the future by research and program interventions.

Action Step 5.3.6 - Conduct research to assess the effects of occupational exposures to pesticides and other agrochemicals on the reproductive, neurological, or neurobehavioral health of men, women, and children.

**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, varied environmental health risks, including 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 quantify. Farm workers are exposed to a wide variety of environmental hazards, chemical exposures, biological agents, and physical agents (noise, heat, cold, vibration, UV light, etc.). Farm workers undertake many work situations: traditional crop and livestock production, machinery repair, welding, and chemical application. The Bureau of Labor Statistics gathers statistics on agricultural injury and fatalities, but this only provides a partial picture of the hazards faced by farmers. Occupational illness is common in agriculture. However, documenting an exposure and its health effect is often difficult because of the long latency period (years) between exposure and health outcome. Better surveillance is needed to determine the extent of and evaluate reduction of these diseases by interventions.

Action Step 5.4.1 – Establish systems to more efficiently access currently available data and acquire new data on exposure and health outcomes associated with environmental and infectious agricultural conditions.

Action Step 5.4.2 – Augment current research associated with animal-related diseases or zoonosis, such as but not limited, to avian influenza, bovine tuberculosis and other emerging issues such as agroterrorism. Exposure assessment, prevention, vaccination and treatment all need to be included in the research.

Action Step 5.4.3 - Test and evaluate interventions that lead to the implementation of best practices and behavioral change related to environmental and infectious exposures.

Action Step 5.4.4 - Develop methods of exposure evaluation as well as ongoing research into the characterization of the pathophysiology of these illnesses.

Action Step 5.4.5 - Increase involvement of the NIOSH Agricultural Research Centers and ERCs to address regional work and environmental hazards associated with unique illness and disease conditions that can be rectified in the future by research and program interventions.

**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, then 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 of circumstances 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 then 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 [Gunderson et al, 1993]. (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 many suicides.

The combination of stress and fatigue has both short and long term consequences [Kidd, Scharf, and Veazie, 1996]. 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, deterioration of societal functioning and even suicide. Furthermore, in considering the psychological health and stressors in agricultural work as it concerns the individual, it is important to examine the ripple effect on interpersonal relationships within rural societies, farm and farm worker families.

More research is needed to examine family, domestic and sexual violence as an adverse effect of stressful agricultural working conditions.

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 targeted research on factors associated with psychological disorders, especially 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.**

The enumeration of workers in the forestry workforce may vary dependant on who does the counting. The numbers also may depend on States and how important forestry is to the economy of each state agency making the count. National counts by aggregating state numbers or Census data may not show the complete picture. For example, until 2001 (2003 in practice) logging was included 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. There are persistent vagaries about which jurisdictional agency is primarily responsible for the safety and health of the forestry workforce. The Census of Agriculture covers farms and farmers and enumerates forestry products but not workers.

Reporting of acute, traumatic deaths and severe injuries related to commercial logging, while of not yet fully determined completeness, appears to be stronger than is the detection of related chronic injuries and illnesses. However, establishing the true causes of injury events is often not possible because of the method by which data are collected or investigations conducted. In states where good data exist on logging and forestry services, the rates of fatalities, disability claims, occupations, exposure events, nature of injuries, 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 on this industry.*

In order to develop performance measures and track improvements in safety and health working conditions, baseline data are needed. Since valid information is difficult to ascertain, the first goal is to improve injury and fatality surveillance options for the forestry sector. Refer to Strategic Goal 1 for a description of the surveillance goals and action steps.

**Intermediate Goal 6.1 - Reduce logging-related deaths and traumatic injuries by 50% by 2018, through collection and analysis of injury data and evidence-based safety improvements.**

Action Step 6.1.1 – Support ongoing improvements in data collection of forestry workforce subsectors (logging, forestry services, etc.) and associated

illness/injury data collection. Assess Census of Agriculture for forestry sector uses and search for new surveillance approaches, e.g., the model used in New Zealand. Target: 2011.

Action Step 6.1.2 - Assess the adequacy of fatality and injury reporting by type of logging (e.g., manual vs. mechanized logging, worker job category, full-time vs. part-time workers) for determination of optimal injury prevention strategies. Target: 2012.

Action Step 6.1.3 – Use available data, research findings, program results, and other evidence of outcomes to identify cost-effective, practical approaches to safe forestry practices. For example, literature and organizational review of national and international forestry improvements can be shared with NIOSH forestry partners (e.g., Swiss: Safety and Health are Feasible in Forestry). Target: 2013.

Action Step 6.1.4 - Determine what approaches or studies might be needed to fill gaps in information needed for developing and testing new interventions, including engineering, information technology, guidelines and policies. Implement trials for improved data collection and review potentials for improvements. Target: 2013.

Action Step 6.1.5 - Determine the impact of solitary work conditions and remote locations on fatality rates 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 to update them 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, and cooperative review. For example, AgFF researchers could collaborate with OSHA and a National Logging Committee composed of experts, state OSHA agencies, etc. to review the standards. Target: 2012.

Action Step 6.2.2 - Review currency of state logging codes, plans for updating and processes used within three years. For example, forestry researchers could help organize regional OSHA offices, state OSHA agencies and industries to stimulate updating current state logging codes. Target: 2013.

Action Step 6.2.3 - Review Federal Safety Standards for coverage of forestry services activities and report within two 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 a model standard for forestry services at the 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 injury investigations by state and federal organizations are not able to show specifics on cause. Comprehensive investigations of injuries and fatalities 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, via legal and ethical interviews, to understand circumstances of the injury event that can be reported in a manner that maintains worker anonymity. Target: 2010.

Action Step 6.3.2 - Conduct trial regional studies (interviews), using interviewers with knowledge of the forestry industry, to assess disabled workers' circumstances of injuries. Target: 2013.

Action Step 6.3.3 - Develop models of risk-taking behaviors with testable hypotheses and assess models with research and data. Target: 2014.

Action Step 6.3.4 – Develop, implement and evaluate interventions designed to reduce risk-taking behaviors among forestry workers and employers. Target: 2016.

**Intermediate Goal 6.4 - Establish a Forestry Sector Partnership to develop new technologies (e.g., synthetic rope, “smart” clothing) that 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. For example, NIOSH and 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. Target: 2010.

Action Step 6.4.2 - Establish a working group for future occupational safety and health research in the forestry sub-sector. Target: 2011.

Action Step 6.4.3 - Conduct trials with technologies (e.g., synthetic rope to replace wire rope) in logging and trucking to document workload reductions and establish best practices guidelines and/or policies. Target: 2012.

Action Step 6.4.4 - Review the use of powered hand tools used in steep terrain to build fire trails and assess use of modified logging equipment to fight wildland fires for safety and health improvements. For example, NIOSH could work with the U.S. Forest Service Equipment Development Centers to reduce workloads in wildland firefighting. Target: 2013.

Action Step 6.4.5 - Review technologies that reduce workloads (e.g., radio-controlled chokers, robotic functions, and autonomous systems for harvesting) and conduct trials for documenting gains; establish best practices guidelines and/or policies. Target: 2012.

**Intermediate Goal 6.5 - Build future capacity in safety and health for the forestry sector via advanced training programs.**

The advancement of injury prevention principles in the forestry and logging sector will require a continuous influx of safety professionals dedicated to building our knowledge base and modifying recommendations as production methods change. Strategic Goal 3 addressed advanced training and certification needs. Specific requests for the forestry sector are noted here.

Action Step 6.5.1 - 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: 2011.

Action Step 6.5.2 - 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: 2011.

## **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, often in inclement weather and for long work shifts. Resulting musculoskeletal diseases and illnesses are often present in workers and may shorten working lives. Exposures to hazards and toxic materials require protective clothing and equipment. Drug (prescription and illegal) and alcohol use is raised as a major concern among forestry workers. The complete health status of workers is not known but has likely changed with mechanization.

Scant data are available regarding forestry workers, their occupational exposures and the disease outcomes associated with work. Without valid data, it is impossible to establish performance measures or track improvements in health status in the sector. Thus, the first priority will be to establish surveillance systems to gather and continuously improve data. Refer to Strategic Goal 1 for a description of the surveillance goals and action steps.

**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 causing muscle strain, e.g., delivering trees to planters in steep terrain. Target: 2012.

Action Step 7.1.2 - Compare and contrast mechanized harvesting operations versus manual systems for health effects. Target: 2012.

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 and other negative health effects. 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. Target: 2013.



**Intermediate Goal 7.2 - Improve the quality and availability of 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 a NIOSH and forestry sector team to continue and monitor developments in this research area, at the NIOSH National Personal Protective Technology Laboratory (NIOSH-NPPTL). Target: 2010.

Action Step 7.2.2 - Assess potentials of “smart clothing” currently used in other sectors (e.g., sports, military) for use in logging and forestry services to provide feedback and data on workers during operations and worker status on tasks. Target: 2011.

Action Step 7.2.3 - Implement trials of “smart clothing” in the forestry sector to collect workload data (e.g., heart rate) and worker status (e.g., heat stress) then facilitate adoption of effective, practical interventions. Target: 2010-2015.

Action Step 7.2.4 - Continue research on inhalation hazards, including dust, and respirators for use in wildland firefighting and assess exposure to smoke for wildland firefighters. Develop a complete product certification standard for respirators. Target: 2012.

Action Step 7.2.5 - Review safety hard hats for improvements (e.g., head and neck protection during falls) that can be applied 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 PPE for hand application of chemicals that is effective in varying forestry environments. 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 alcohol and illicit prescription or other drugs, 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 determine if recordkeeping provides basis for assessment. Target: 2011.

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 (e.g., methamphetamines) on the job. Target: 2013.

Action Step 7.3.4 - Assess current methodologies available to employers and improve them for field testing of workers for drug impairment. Target: 2014.

Action Step 7.3.5 - Develop strategies for eliminating “perceived” need for drug use on the job. For example strategies might address wake/rest cycles, alert warning devices, workload reduction, and rest/refreshment breaks. 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 those at later career stages.**

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.

For example, health screenings may suggest worker pre-conditions for illness or disease that adjustments in work practices can help alleviate. Target: 2015.

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 30 times more likely to die pursuing their occupation than the average worker in America. According to Bureau of Labor Statistics for 2007 [U.S. Department of Labor, 2008] the fatality rate for commercial fishing sector was 111.8 per 100,000 workers (previously 141.7 for the 2007 report). This compares to the national average of 3.7 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 per year. During this same time period, 127 vessels were lost on average 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%) [U.S. Coast Guard, 2006].

The impact of the high rate of death and injury on fishing communities and fishermen's families is severe. The independent culture of those within the F3.2 industry and the limited safety and health regulations combine to create an environment where high risk practices may be 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. Exacerbating 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 NORA 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, 51% of fatalities in the commercial fishing industry are attributed to flooding, sinking, or capsizing of the vessel [U.S. Coast Guard, 2006]. Another 29% of the fatalities were due to 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 vs. preventing the vessel from sinking. Mitigating these events has resulted in measurable decreases in fatalities.

Injury solutions have focused on education and other outreach efforts and should continue. 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 et al., 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 in each region to reduce injury and fatality rates by half. Such interventions may include 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 fatalities. Target: 2013.

Action Step 8.1.7 - 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 - 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 vessels 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 - Develop and evaluate best practices for preventing falls overboard and fatalities due to falls overboard. These would include activities such as field evaluations of Personal Flotation Devices (PFDs), surveys of fishermen, developing better recovery devices and practices. Target: 2010.

*The Commercial Fishing Industry Vessel Safety Advisory Committee has begun working on this best practices guidance.*

Action Step 8.2.2 - Publicize best practices and recommendations for preventing falls overboard and reducing fatalities due to falls overboard. Target: 2012.

*The Commercial Fishing Industry Vessel Safety Advisory Committee has chosen to focus on this effort.*

**Intermediate Goal 8.3 - Understand and reduce the number, rate, and severity of hospitalized injury 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 – Identify data sources to analyze and determine high risk operations leading to serious non-fatal injuries by fishery (see Action Step 1.2.6 Commercial Fishing Injury Database and Action Step 1.3.5 for the Census of Fatal Occupational Injuries). Target: 2010.

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

Action Step 8.3.3 – Complete fishery-specific outreach plans to share best practices for high-risk operations (see Action Step 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 affect 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 specific guidelines for fisheries managers to use when assessing the potential safety issues that a proposed or current fisheries plan contains (such as overcapitalization, human resource issues, and economic pressures). Target: 2012.

## **References**

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## **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 their prevention. 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.

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

<b>Intermediate Goal 9.2 - Measure and reduce illnesses and disease due to exposures to physical factors such as noise, cold, heat, and ultraviolet radiation.</b>
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Action Step 9.2.1 - Conduct continued research on exposures and related disease/injury rates 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 biological organisms, chemicals, particulate matter).**

Action Step 9.3.1 – Conduct continued research on exposures and related disease rates to other exposures such as biological organisms, chemicals and particulate matter.

Action Step 9.3.2 - Test and evaluate interventions that lead to implementation of best practices and behavioral change.

## **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 differences in the forestry industry, 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 U.S., 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. 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 using 2007 BLS data [NAS 2008].

<b>National Statistics</b>	<b>Sources</b>	
	<b>BLS*</b>	<b>Census*</b>
<b>Worker Categories:</b>		
Logging	68	83.4 (1997) 69 (2004 CBP)
Forestry Services	12	5 (2004 CBP) 26.5 (1997 CBP)
Support Services	? % of 103	?% of 97.5
Fatal rate calculation	88.7	NI
Truckers/transport	NI	NI
Self Employed	NI	NI
Seasonal workers	NI	NI
Non-wood harvesters	NI	2 (2004 CBP)
Forestry Professionals	NI	NI
Forest Landowners	NI	NI
Logging Firms	NI	13.6 (1997) 11 (2004)
<b>Total Workers</b> (excluding owners & foresters)	<b>92</b>	<b>76</b>
* Numbers listed in thousands		
<b>BLS</b> = Bureau of Labor Statistics		
<b>CBP</b> = county business patterns data		
<b>NI</b> = not included		

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 demand effective action.

### Forestry Fatalities, Injuries and Illnesses

Logging fatalities often place that industry in the top three most dangerous jobs based on fatality rates: in 2006, 95 fatalities for 111,000 employees gives a rate of 85.6 deaths/100,000 ([http://www.bls.gov/iif/oshwc/foi/CFOI\\_Rates\\_2006.pdf](http://www.bls.gov/iif/oshwc/foi/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 2008]

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 documentation) and migrate to various areas across the U.S. following seasonal work in forestry or firefighting.

### Cooperating Organizations

Example 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; FORWONET (international network of interested forestry workforce professionals)

#### OPERATIONAL COOPERATORS:

(examples by state to show connections)

- American Loggers Council (state/regional affiliates) [www.americanloggers.org](http://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 state agencies:

#### 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





















### References

NAS [2008]. Agriculture, Forestry, and Fishing Research at NIOSH. National Research Council and Institute of Medicine of the National Academies. National Academies Press, 500 Fifth Street, NW, Lockbox 285, Washington DC 20055.

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


The purpose of this dictionary is to increase standardization in the meaning of terms used by safety and health professionals to describe and report occupational hazards, risks, injury, disease and illness used in occupational safety and health research.

















### A

			<p><b>Abbreviated Injury Scale:</b> The Abbreviated Injury Scale (AIS) is 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.</p> <table border="1"> <thead> <tr> <th>AIS Score</th> <th>Injury</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Minor</td> </tr> <tr> <td>2</td> <td>Moderate</td> </tr> <tr> <td>3</td> <td>Serious</td> </tr> <tr> <td>4</td> <td>Severe</td> </tr> <tr> <td>5</td> <td>Critical</td> </tr> <tr> <td>6</td> <td>Unsurvivable</td> </tr> </tbody> </table>	AIS Score	Injury	1	Minor	2	Moderate	3	Serious	4	Severe	5	Critical	6	Unsurvivable
AIS Score	Injury																
1	Minor																
2	Moderate																
3	Serious																
4	Severe																
5	Critical																
6	Unsurvivable																
			<p><b>Accident:</b> 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 terms such as injury incident or unintentional injury].</p>														
			<p><b>Adolescents:</b> Individuals from the age of 13 through 17 years.</p>														
			<p><b>Aft:</b> Rear portion of vessel.</p>														
			<p><b>Age-appropriate Work:</b> 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.</p>														
			<p><b>Age Groups:</b> Preferred presentation of research data involving age groups is by groups of 5 years (e.g., &lt;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., 10-11, 12-13, 14-15...18-19). If age group focuses on ages 65+, preferred presentation is by groups of 10 years (e.g., 65-74, 75-84...). When two or more age groups are collapsed use the same delineations, e.g., 5-14, 55-69.</p>														
			<p><b>Agriculture:</b> The industry that involves the production of crops and livestock (farming; production agriculture) plus agricultural services, forestry, commercial fishing, and hunting and trapping. See also North American Industry Classification System.</p>														
			<p><b>Agricultural Field Equipment:</b> Agricultural tractors, self-propelled machines, implements, and combinations thereof designed primarily for agricultural field operations.</p> <ul style="list-style-type: none"> <li>• <b>Agricultural Tractor (ATR):</b> A traction machine, intended primarily for off-road usage, designed and advertised primarily to supply power to agricultural implements. An agricultural tractor propels itself and provides a force in the direction of travel and may provide mechanical, hydraulic and/or electrical power to agricultural implements to enable them to perform their intended functions.</li> <li>○ <b>Two-Wheel Drive Tractor:</b> An agricultural tractor with traction power provided only</li> </ul>														


































		<p>through the rear tires. The front tires are smaller than the rear and typically use a profile type with no traction capability.</p> <ul style="list-style-type: none"> <li>○ <b>Two-Wheel Drive Tractor with Front Assist:</b> An agricultural tractor with primary power provided through the rear tires and assist power through the front tires. Front tires are generally larger in rolling radius than a two-wheel drive tractor and use a tire profile that will transmit traction capability.</li> <li>○ <b>Four-Wheel Drive Tractor:</b> An agricultural tractor with equal sized wheels and having equal and full time power to all wheels. Steering is accomplished by articulation or a rigid frame with all wheel steering.</li> <li>○ <b>Track-Laying Tractor:</b> An agricultural tractor with the primary interface for traction using even multiples of belted or link drive tracks. Belted units in this definition may have either a positive, friction or combination positive-friction drive. Belts that fit over regular tractor tires are not included in this definition.</li> <li>○ <b>Compact Utility Tractor:</b> A small agricultural tractor equipped with a 540-rpm rear PTO (ASAE S203) and a three-point hitch designed for Category I (ASAE S217) implements only. These tractors generally have a mass less than 1800 kg (4000 lb.); have less than 30 PTO kW (40 hp) and are primarily designed and advertised for use with mowers and light-duty material handling equipment. Tractor mass is the mass of the unloaded tractor in operating order with tanks and radiators full, including protective structure with cladding and any wheel equipment or additional front-wheel drive components required to support the tractor static weight. The operator, optional hitch equipment, optional ballast weights, additional wheel equipment, and other special equipment are not included.</li> <li>○ <b>Utility Transport Tractor:</b> An agricultural tractor that combines the primary functions as described in Agricultural tractor (ATR) with the capability to transport materials in conditions requiring greater maneuverability of equipment. For transport functions, in addition to offering the feature of a drawbar or three-point hitch, this tractor can utilize load-carrying devices to transmit portions of a towed load onto the tractor chassis. This provides for closer coupling of the tractor and trailed implement for improved maneuverability. Configurations may include mounted boxes or tanks for transport of materials.             <ul style="list-style-type: none"> <li>▪ <b>Utility Transport Tractor (Type 1):</b> A tractor as defined in Utility transport tractor with the provision for only the operator.</li> <li>▪ <b>Utility Transport Tractor (Type 2):</b> A tractor as defined in Utility transport tractor with the provision for an operator and additional personnel.</li> </ul> </li> <li>○ <b>Low Profile Tractor:</b> An agricultural tractor optimized for low clearance operation and advertised for use in orchards and low headroom applications. It is usually configured with the following characteristics:             <ul style="list-style-type: none"> <li>▪ On wheeled tractors, the front wheel spacing is equal to the rear wheel spacing, as measured from the centerline of each right wheel to the centerline of the corresponding left wheel.</li> <li>▪ The clearance from the bottom of the tractor chassis to the ground does not exceed 460 mm (18 in.).</li> <li>▪ The highest point of the hood does not exceed 1525 mm (60 in.).</li> </ul> </li> <li>○ <b>Orchard Tractor:</b> An agricultural tractor for operation in orchards incorporating shielding to minimize the snagging of branches, to provide protection for the operator and to minimize damage to fruit. It is usually configured with narrow hoods, and with hood height and steering wheel/column height under 1525 mm (60 in.), which are design features to address these requirements.</li> <li>○ <b>Vineyard or Narrow Profile Tractor:</b> An agricultural wheeled tractor with a narrow overall width. The minimum track width is less than 1150 mm (45 in.).</li> <li>○ <b>Mudder Tractor:</b> An agricultural wheeled tractor having a higher crop clearance than standard tractors. Clearance under the front and rear axles exceeds 500 mm (20 in.). Higher clearance is usually achieved by, but not limited to, using taller section tires. These tractors are equipped with Front Wheel Drive Assist to operate in adverse field conditions such as irrigation or crossing of irrigation ditches. These tractors are typically advertised for use in mature vegetable crops. A prime use is in harvesting of the crop requiring lower ground speeds than provided on standard agricultural tractors.</li> <li>○ <b>High-Clearance Tractor:</b> A two wheel drive agricultural tractor designed for operation in vegetables, cotton, rice, tobacco or other specialty row crops requiring high clearance to avoid crop damage. High-clearance tractors are typically</li> </ul>
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		<p>characterized by the addition of extended length axle spindles for front axles with rear axle modifications that provide an axle output significantly below the centerline of the rear axle trumpets. They are normally equipped with large diameter, narrow width tires to minimize crop damage. Typical drawbar to ground clearance exceeds 450 mm (17.7 in.)</p> <ul style="list-style-type: none"> <li>○ <b>Agricultural Scraper Tractor:</b> An agricultural tractor, either wheeled or track laying, adopted and advertised primarily to pull one or more tow behind scrapers as defined in ISO 6165.</li> <li>● <b>Agricultural Implement:</b> An implement that is designed to perform agricultural field operations.             <ul style="list-style-type: none"> <li>○ <b>Towed Implement (ATI):</b> An implement that is pulled by a tractor and is usually equipped with wheels required for transport.</li> <li>○ <b>Mounted Implement:</b> <ul style="list-style-type: none"> <li>▪ <b>Rear Mounted (MER):</b> An implement that is mounted directly on the rear of the tractor and is fully carried by the tractor during transport.</li> <li>▪ <b>Front Mounted (MEF):</b> An implement that is mounted directly on the front of the tractor and is fully carried by the tractor during transport.</li> </ul> </li> <li>○ <b>Semi-Mounted Implement:</b> <ul style="list-style-type: none"> <li>▪ <b>Rear Semi-Mounted (SMR):</b> An implement that is partially mounted on the rear of the tractor and partially carried on wheels during operation and/or transport.</li> <li>▪ <b>Front Semi-Mounted (SMF):</b> An implement that is partially mounted on the front of the tractor and partially carried on wheels during operation and/or transport.</li> </ul> </li> <li>○ <b>Self-Propelled Machine (SPM):</b> A machine designed with an integral power unit to provide mobility, tractive effort, and process power for performing agricultural operations. Definitions for some self-propelled machines follow. Agricultural tractors are excluded.             <ul style="list-style-type: none"> <li>▪ <b>Self-Propelled Beet Harvester:</b> A self-propelled machine that digs and conveys sugar beets to an attached bin or into an accompanying truck or wagon.</li> <li>▪ <b>Self-Propelled Combine:</b> A self-propelled machine for harvesting a wide variety of grain and seed crops. Normally this machine also gathers the crop.</li> <li>▪ <b>Self-Propelled Cotton Harvester:</b> A self-propelled machine for selection and collecting cotton from open bolls on cotton stalks consisting of picking heads equipped with revolving spindles or other picking means, a conveying means, and a bin for carrying the picked cotton.</li> <li>▪ <b>Self-Propelled Forage Harvester:</b> A self-propelled machine that gathers and chops forage crops. The machine usually has a discharge that loads the chopped material into an accompanying wagon or truck.</li> <li>▪ <b>Self-Propelled Forage Baler:</b> A self-propelled machine that picks up and compresses loose forage into compact secured bales. Bales are discharged to ground surface or to an accompanying conveyance.</li> <li>▪ <b>Self-Propelled High Clearance Sprayer:</b> A self-propelled machine that carries a supply tank, pump, and spray heads for spraying crops that require high clearance. Crop clearance of the machine is usually over 1220 mm (48 in.).</li> <li>▪ <b>Self-Propelled Windrower or Mower Conditioner:</b> A self-propelled machine that cuts and gathers standing forage, grain crops, or seed crops into windrows for drying and pickup. In forage operations, the machine normally includes a crop conditioning attachment.</li> <li>▪ <b>Self-Propelled Telehandlers:</b> A self-propelled machine designed and advertised for both the mobility and handling of agricultural materials. These machines are equipped with telescopic boom lifts for material placement. A drawbar may also be provided for light towing applications.</li> <li>▪ <b>Self-Propelled Automatic Bale Accumulator:</b> A self-propelled machine that picks up, accumulates, stacks and deposits bales of forage that have been deposited on the ground.</li> </ul> </li> <li>○ <b>Bulk Carrier Equipment (ABC):</b> An agricultural trailer whose primary purpose is to transport agricultural products. Examples include but are not limited to livestock watering and waste hauling systems, bulk grain and fertilizer carts, forage wagons, and the associated running gear for any of the aforesaid.</li> </ul> </li> </ul>
		<p><b>Agricultural Hazardous Occupations Orders (AgHO):</b> 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</p>




			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.
			<b>Agricultural Sector Hazard:</b> 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.
			<b>Agricultural Sector Injury:</b> 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.
			<b>Agritourism:</b> 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.
			<b>Alaska Marine Safety Education Association (AMSEA):</b> Non-profit agency which conducts marine safety instructor-training and produces educational materials and training to commercial fishermen nationally.
			<b>Alternative Communication System:</b> A system by voice, hand or media other than horn or whistle which provides a safe and reliable method of communication between crew members.
			<b>Animal Feeding Operation (AFO):</b> 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 <i>and</i> structures or animal traffic prevents vegetative growth.
			<b>Approved Container:</b> A metal or polyethylene (plastic) container that can be used to carry flammable liquids in quantities up to five 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).
			<b>Aramid:</b> 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.
			<b>Arch:</b> Any device attached to the back of a mobile vehicle and used for raising one end of logs to facilitate movement.
			<b>All-Terrain Vehicle (ATV):</b> 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.
			<b>Auxiliary Generator:</b> Also called light plant or generator. Engine which provides additional electricity to vessel.




**B**

















			<b>Backcut (Falling Cut):</b> The cut opposite of the face cut.
			<b>Ballistic Nylon:</b> A nylon fabric of high tensile properties designed to provide protection from lacerations.
			<b>Base of Tree:</b> That portion of a tree that is not more than 12 inches above highest ground level.
			<b>Behavioral Healthcare:</b> 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.
			<b>Best Management Practice (BMP):</b> Methods or techniques found to be the most effective and practical means in achieving an objective, such as preventing or minimizing hazards, risks, hazardous exposures, etc., or in increasing safety-related behaviors.
			<b>Bight of the Line:</b> A hazardous zone created by one or more lines under tension,

			or a point on a line where a rigging chain is attached.
			<b>Bilge:</b> Deepest portion of the interior of a vessel. Place where water accumulates easiest.
			<b>Binder:</b> 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.
			<b>Boundary Line:</b> A regulatory line for commercial fishing safety regulations that generally runs from the outermost point of land to the outermost point of land.
			<b>Bow:</b> Forward end of vessel.
			<b>Bouyant Apparatus (BA):</b> 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.
			<b>Brow Log:</b> A log placed parallel to any roadway at a landing or dump site to protect carriers while loading or unloading.
			<b>Buck:</b> To cut a fallen tree into logs.
			<b>Buffer Strip:</b> 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.
			<b>Buffer Strip:</b> Linear vegetation of various widths separating land features or uses with the purpose of protecting water quality, riparian zones, wildlife habitat or visual resources.
			<b>Bulkheads:</b> Walls between different compartments of a vessel. Bulkheads are often watertight.
			<b>Bulwarks:</b> Sides of the vessel above the decks.
			<b>Bump Cap:</b> 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.
			<b>Butt:</b> The bottom cut or the first log of a fallen tree.
			<b>By-Catch:</b> The incidental taking of non-targeted fish species.
			<b>Bystander:</b> A person who is present at or near a production agriculture, forestry or fishing worksite without participating in the work.
			<b>By-Pass Starting:</b> General term used when the safe start procedure for any tractor or self-propelled machine is circumvented, for example, shortening across the starter solenoid with a metal object, or starting a machine with the key from the ground rather than the operator's station.


**C**

			<b>Capstain (Gypsy Head):</b> Vertical or horizontal drums fitted to a windlass for handling the line portion of working lines as for anchors, mooring lines or fishing gear.																				
			<b>Cable Yarding:</b> 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.																				
			<p><b>Categorical Variables—Production Agriculture:</b> Used to define specific descriptive characteristics of injury incidents in production agriculture and its support services. Preferred categories and category titles are:</p> <table border="1"> <thead> <tr> <th>Type of Operation</th> <th>Source of Injury</th> <th>Injury Severity*</th> <th>Activity at Time of Injury</th> </tr> </thead> <tbody> <tr> <td>Crops &amp; Livestock</td> <td>Tractor</td> <td>First Aid</td> <td>Animals, Feeding</td> </tr> <tr> <td>Cash Grains Only</td> <td>Field Machine</td> <td>Temporary Disabling</td> <td>Animals, Moving/Loading/Sorting, Etc.</td> </tr> <tr> <td>Hay Crops Only</td> <td>Self-Propelled Farm Machine</td> <td>Permanent Disability</td> <td>Animals, Treating, Vaccinating, Ear Tagging, Shoeing, Etc.</td> </tr> <tr> <td>Vegetable, fruit, nuts</td> <td>Machine Farmstead Machinery</td> <td>Fatality</td> <td></td> </tr> </tbody> </table>	Type of Operation	Source of Injury	Injury Severity*	Activity at Time of Injury	Crops & Livestock	Tractor	First Aid	Animals, Feeding	Cash Grains Only	Field Machine	Temporary Disabling	Animals, Moving/Loading/Sorting, Etc.	Hay Crops Only	Self-Propelled Farm Machine	Permanent Disability	Animals, Treating, Vaccinating, Ear Tagging, Shoeing, Etc.	Vegetable, fruit, nuts	Machine Farmstead Machinery	Fatality	
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			<p>Greenhouse, Nursery, Floriculture                  Beef Only                  Swine Only                  Sheep, Goats Only                  Poultry Only                  Dairy Only                  Horse Only                  Other Animal Only (Specify)</p> <p>Non-Powered Wagon or Cart                  Livestock                  Hand Tool                  Power Tool                  Pesticide/Chemical                  Plant/Tree                  Building/Structure                  Working Surface                  Truck/Auto                  ATV/MUV                  Other (Specify)</p> <p>*See further descriptions under Injury Severity</p> <p><b>Location of Incident</b>                  Field, Pasture                  Barn--Outdoor Pen                  Feedlot, Corral, Paddock                  Barn--Indoor Pen, Feedlot, Corral, Paddock                  Barn—Other Area                  Non-Barn Structure (Manure Pond, Silo, Packing Shed, Greenhouse, Etc.)                  Other Farmstead Area                  Roads, Lanes (Specify)</p>	<p>Animals, Other Handling                  Machinery Service or Repair                  Building/Structure Service/Repair                  Field Work (Tillage, Planting, Harvesting)                  Traveling Between Locations                  Storing /Handling Harvested Crops                  Manual Handling of Containers, Bags, Pots, Materials, Etc.                  Powered Handling of Containers, Bags, Pots, Materials, Etc.                  Other (Specify)</p> <p><b>Nature of injury</b>                  Amputation                  Bruise                  Burn                  Cut                  Crush                  Fracture                  Puncture                  Sprain/Strain                  Multiple Injury                  Other (Specify)</p> <p><b>Type of Event</b>                  Caught In/By                  Caught Between                  Caught Under                  Contact by Sharp Object                  Entanglement                  Fall, Same Level                  Fall, Elevation                  Overexertion                  Run Over                  Struck By/Against                  Struck by Falling Object                  Struck by Flying Object                  Other (Specify)</p>	<p><b>Part of Body Injured</b>                  Head/neck                  Eye                  Chest/Trunk                  Back                  Arm/Shoulder                  Finger                  Hand/Wrist                  Leg/Knee/Hip                  Foot                  Multiple Parts                  Other (Specify)</p>
			<p><b>Census of Fatal Occupational Injury (CFOI):</b> A Federal-State cooperative program implemented in all 50 States and the District of Columbia. To compile counts that are as complete as possible, CFOI 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.</p> <ul style="list-style-type: none"> <li>• <b>Traumatic Injury:</b> 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.</li> <li>• <b>Occupational Disease (Illness):</b> 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.</li> <li>• <b>Work Relationship Criteria:</b> A <i>work relationship</i> exists if an event or exposure results in the fatal injury or illness of a person: (1) ON the <i>employer's premises</i> and the person was there to <i>work</i>; or (2) OFF the <i>employer's premises</i> and the person was there to <i>work</i>, or the event or exposure was related to the person's <i>work</i> or status as an employee. The <i>employer's premises</i> include buildings, grounds, parking lots, and other facilities and property used in the conduct of business. <i>Work</i> 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</li> </ul>		

			<p>States. The following are clarifications of the CFOI work relationship criteria:</p> <ul style="list-style-type: none"> <li>▪ <b>Volunteer Workers:</b> 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.</li> <li>▪ <b>Institutionalized Persons:</b> 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.</li> <li>▪ <b>Suicides and Homicides:</b> Those that meet the CFOI work relationship criteria are IN scope.</li> <li>▪ <b>Fatal Heart Attacks and Strokes:</b> 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.</li> <li>▪ <b>Recreational Activities:</b> 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.</li> <li>▪ <b>Travel Status:</b> 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.</li> <li>▪ <b>Commuting:</b> Fatal events or exposures that occurred during a person's commute to or from work are OUT of scope.</li> </ul>
			<b>CFVISAC (Commercial Fishing Industry Vessel Advisory Committee):</b> Federal advisory committee to the Coast Guard providing recommendations on fishing vessels safety. Established by the Commercial Fishing Vessel Safety Act of 1988.
			<b>Child (pl Children):</b> Individuals in the age range of birth through 12 years of age.
			<b>Chock:</b> A block, often wedge-shaped, which is used to prevent movement; for example, a log from rolling, a wheel from turning.
			<b>Choker:</b> Length of wire rope, chain or synthetic material with attachments for encircling a log, pole or other material to be moved.
			<b>Competent (Safety &amp; Health) Person:</b> A qualified person who has been authorized by the employer or employer representative to: <ul style="list-style-type: none"> <li>(a) identify existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to employees, and</li> <li>(b) eliminate the hazard or take corrective action.</li> </ul>
			<b>Concentrated Animal Feeding Operation (CAFO):</b> A subcategory of an AFO (see Animal Feeding Operation) that is further defined as a Large or 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.)
			<b>Confine a Fire:</b> To restrict the fire within determined boundaries established either prior to the fire or during the fire.
			<b>Control a Fire:</b> To complete a control line around a fire, and spot fires 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.
			<b>Cumulative Trauma:</b> Bodily injury from mechanical stress which develops gradually over weeks, months, or years from repeated stress (force or exertion) on a particular body part.
			<b>Cut-up-Tree/Snag:</b> A tree/snag, left standing, with the falling cuts started or completed.
			<b>Cutter:</b> One whose primary job is to manually fall, buck, or limb trees.






















**D**





			<b>Danger Tree:</b> 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
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			degree and direction of lean.
			<b>DBH:</b> <u>D</u> iameter at <u>B</u> reast <u>H</u> eight.
			<b>Deadman:</b> Buried log or other object used as an anchor.
			<b>Deck:</b> A stack of trees or logs.
			<b>Deck:</b> The top of a vessel that is walked on and exposed to the seas.
			<b>Developmentally-Appropriate Tasks:</b> 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.
			<b>Direct Supervision:</b> Supervision by a competent person who watches over and directs the work of others who are within sight and unassisted natural voice contact.
			<b>Domino Falling:</b> 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, or (b) two or more trees at the same time because their limbs are interlocked.
			<b>Double Tree Intermediate Support System:</b> 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.
			<b>Downrigger:</b> Apparatus for lowering fishing gear down into water.
			<b>Downflooding:</b> Entry of water into the hull which results in progressive flooding and loss of stability.
			<b>Dredges:</b> 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.
			<b>Drum:</b> Where long line is wound around to deploy and take up; part of a winch.

**E**















			<b>E Codes:</b> Codes for external cause of injury that provide a systematic way to classify information put into the medical records by hospital staff. Have been replaced by ICD codes.
			<b>EEZ (E</b> xclusive <b>E</b> conomic <b>Z</b> one): The zone extending 200 miles from shore. Only U.S. vessels may fish within this zone.
			<b>Emergency Care:</b> Care provided by a person who is first aid and CPR trained.
			<b>Emergency Medical Service:</b> Care provided by a medically trained person such as in a hospital, clinic, ambulance or rescue vehicle.
			<b>Emergency Scene:</b> A site that is: <ul style="list-style-type: none"> <li>• immediately threatening to life, health, property or environment;</li> <li>• has already caused loss of life, health detriments, property damage or environmental damage; or</li> <li>• has a high probability of escalating to cause immediate danger to life, health, property or environment.</li> </ul>
			<b>EPIRB (E</b> mergency <b>P</b> osition <b>I</b> ndicating <b>R</b> adio <b>B</b> eacon): Apparatus that transmits radio beacon to satellite to locate vessel in distress.
			<b>Equipment Protection Designations:</b> The listing of specific guarding requirements for specific logging machines.
			<b>Escape Route:</b> A planned and understood route to move to a safety zone or other low-risk area.
			<b>Experienced Person:</b> A person who has sufficient knowledge, training, experience and skill in all aspects of a given process or procedure.







			<b>Exposure:</b> Contact or proximity to a condition or event which may produce injury, disease, illness, property or environmental damage.
			<b>Extreme Weather Conditions:</b> 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**


















			<b>Factory Ship:</b> Ship in which fish are processed and frozen. May also catch fish or just obtain fish from smaller catcher vessels.
			<b>Fairlead:</b> 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.
			<b>Fall:</b> To cut down trees.
			<b>Faller:</b> A person who falls (cuts down) trees.
			<b>Farm and Agricultural Injury Classification (FAIC) Code:</b> 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. <b>FAIC-1. Farm Production Work (NAICS 111, Crop Production; 112, Animal Production).</b> Victim engaged in work activity related to agricultural production. <b>FAIC-2. Forestry and Logging (NAICS 113).</b> Victim engaged in work related to growing and harvesting timber on a long production cycle (i.e., of 10 or more years). <b>FAIC-3. Fishing, Hunting &amp; Trapping (NAICS 114).</b> 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. <b>FAIC-4. Agricultural and Forestry Support Activities (NAICS 115).</b> 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). <b>FAIC-5. Farm Hazard Exposure, outside services.</b> Victim associated with a business or service and injured on a farm while providing services to the farm. <b>FAIC-6. Farm Hazard Exposure, Non-workers: Equipment, Tools, Objects &amp; Products.</b> Victim engaged in an activity involving agricultural machines, equipment, tools, products, etc., but not related to farm production operations. <b>FAIC-7. Farm Hazard Exposure, Non-workers: Structures and Landscape.</b> Victim not actively engaged in a work activity but injured as a result of exposure to hazards of farm structures and landscape. <b>FAIC-8. Farm Hazard Exposure, Non-workers: Animals.</b> Victim not actively engaged in a work activity but injured as a result of exposure to agricultural animal hazards. <b>FAIC-9. Farm Hazard Exposure: Roadway Collision.</b> Victim not actively engaged in a work activity but injured as a result of collision with agricultural hazard on roadway.













		<p><b>Family Farms:</b> Any farm organized as a sole proprietorship, partnership, or family corporation. Family farms exclude farms organized as nonfamily corporations or cooperatives, as well as farms with hired managers (see Nonfamily Farms). Family farms are further divided by gross sales:</p> <p><b>Small Family Farms</b>--Gross sales less than \$250,000:</p> <p><b>Limited-Resource Farms.</b> 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).</p> <p><b>Retirement Farms.</b> Small farms whose operators report they are retired.</p> <p><b>Residential/Lifestyle Farms.</b> Small farms whose operators report a major occupation other than farming.</p> <p><b>Farming-Occupation Farms.</b> Small family farms whose operators report farming as their major occupation.</p> <p><b>Low-Sales Farms.</b> Gross sales less than \$100,000.</p> <p><b>High-Sales Farms.</b> Gross sales between \$100,000 and \$249,999.</p> <p><b>Large-Scale Family Farms</b>--Gross sales of \$250,000 or more.</p> <p><b>Large Family Farms.</b> Gross sales between \$250,000 and \$499,999.</p> <p><b>Very Large Family Farms.</b> Gross sales of \$500,000 or more.</p>
		<p><b>Farm:</b> 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).</p> <p><b>Point Farm:</b> 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.</p>
		<p><b>Farm Vehicle:</b> 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.</p>
		<p><b>Farm Worker:</b> A person who is employed by a farm owner to conduct agricultural work. This term includes, but is not limited to, migrant and seasonal laborers.</p>
		<p><b>Farm/Ranch Work-Related Injury:</b> An injury occurring during the business of operating a farm or ranch <i>and</i> which resulted in four hours or more of restricted activity. See Restricted Activity.</p>
		<p><b>Farrow-to-Finish Operation:</b> The production of swine which involves maintaining a herd of sows to birth (farrow) piglets, which are then raised to slaughter market size and sold by the same farm.</p>
		<p><b>Fathom:</b> A length or depth of 6 feet.</p>
		<p><b>Fire Camp:</b> Geographical site(s) equipped and staffed to provide sleeping, food, water and sanitary services to fire personnel.</p>
		<p><b>Fire Fighting Equipment:</b> All portable and fixed fire suppression and control equipment.</p>
		<p><b>Fire Shelter:</b> A personal protection item carried by firefighters which when deployed forms a shelter of heat reflective materials.</p>
		<p><b>Fisherman’s Fund:</b> 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.</p>
		<p><b>Fisheries Observer:</b> Usually 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 the U.S. with observers.</p>
		<p><b>Fishery:</b> The area, fishing method, and time period in which a specific species of fish is harvested for commercial fishing purposes.</p>
		<p><b>First on the Scene:</b> 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.</p>











		<b>Flame Resistance:</b> The property of material, or combinations of component materials, to retard ignition and restrict the spread of flame.
		<b>FOPS (Falling Object Protective Structure):</b> 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.
		<b>Fore:</b> The forward portion of the vessel.
		<b>Forepeak:</b> The forward interior-most portion of vessel.
		<b>Forest:</b> Public or private forest lands exclusive of municipal parks and urban forests.
		<b>Forestry Workforce:</b> 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; plant site log yards and independent sort yards; log hauling.

**G**

















		<b>Gantry:</b> A frame-like structure for hauling back fishing gear such as trawls.
		<b>Gillnet:</b> Net stretched from back of smaller vessels to capture salmon by gills. Usually used close to shore and in rivers.
		<b>Give Way Vessel:</b> A vessel due to its relationship to another that is deemed to change its course and speed to avoid a collision.
		<b>GMO (Genetically Modified Organisms):</b> An organism such as plant or animal, with an artificially modified genetic make-up.
		<b>Grain Bin:</b> An enclosed structure, usually cylindrical, in which low-moisture grain is stored. Many grain bins have agitation and aeration means to help keep the grain in condition.
		<b>Ground Tackle:</b> Anchor, chain and rope used in anchoring a vessel.
		<b>Grounded:</b> Placement of a tree on the ground.
	 	<b>Grounded:</b> A method to dissipate static or electrical charges.
		<b>Grounded (Machines):</b> The placement of a machine component on the ground or device where it is firmly supported.
		<b>Grounded:</b> The intentional or unintentional landing of a vessel on land.
	 	<b>Guard:</b> 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.
		<b>Guyline:</b> A standing line used to support or stabilize a spar, tail tree, intermediate support tree, electrical pole, machinery or equipment.
		<b>Gurdie:</b> Salmon troller hydraulic gear that bring up the lines.






**H**

		<b>Hawse Pipe:</b> Holes that go through the bulwarks through which anchors and line may pass.
	 	<b>Hazard:</b> Any existing or potential condition which, by itself or by interacting with other variables, can result in injury, illness, death, or other losses.
	 	<b>Health:</b> 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.
	 	<b>Health Care Provider:</b> A health care practitioner operating within the scope of their license, certificate, registration, or legally authorized practice.

			<b>Health Care Professional Shortage Area:</b> 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.
			<b>Heaving To:</b> A heavy weather tactic involving drifting with no forward motion, often assisted with a drag to keep the bow into the seas.
			<b>High Lead:</b> 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.
			<b>High Seas:</b> Outside of the three mile line from shore.
			<b>High Visibility Colors:</b> 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 more easily seen.
			<b>Hydrostatic Release:</b> A mechanism that automatically releases survival gear such as life rafts and EPIRB. Usually operates once it is 12-15 feet below the surface of the water.

I

			<b>Immersion Suit:</b> Also called a survival or "gumby" suit. Coverall like garment that provides flotation and hypothermia protection to wearer.
			<b>Individual Fishing Quota (IFQs):</b> See ITQs.
			<b>Individual Transferable Quotas (ITQs):</b> 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.
			<b>Inflatable Buoyant Apparatus (IBA):</b> An inflatable raft without canopy or ballast pockets which provides out of water protection. Required for fishing vessels a moderate distance from shore.
			<b>Injury:</b> 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. <ul style="list-style-type: none"> <li>• Acute injury - refers to injury effects that occur in seconds, minutes or hours.</li> <li>• Chronic injury - refers to injury effects that occur in weeks, months or years.</li> </ul>
			<b>Injury Control:</b> Incorporates multiple activities to reduce frequency and/or severity of injury, including prevention, treatment, and rehabilitation.
			<b>Injury Prevention:</b> Attempts to reduce the incidence of injury, usually through educational, engineering, administrative, environmental, and enforcement interventions.
			<b>Injury Severity:</b> Describes the seriousness of injury to a victim. Preferred categories include: <ul style="list-style-type: none"> <li>• First aid—an injury requiring first aid treatment only; less than four hours of loss time or restricted activity;</li> <li>• Temporary disabling—injury results in 4 hours or more of lost time or restricted activity;</li> <li>• Permanent disability—injury results in loss or use of one or more body parts, e.g., amputation, blindness, spinal column injury; and</li> </ul>



		<ul style="list-style-type: none"> <li>• Fatal—loss of life.</li> </ul>
		
		
		

**International Classification of Diseases (ICD) Codes:** The international standard diagnostic classification for all general epidemiological and many health management purposes. Provides the basis for the compilation of national and international mortality and morbidity statistics.

**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 (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:** A small outboard motor which acts as a back up to the main motor or is used in trolling.

**Kicker:** 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 (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 term used for 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:** A segment sawed or split from a fallen tree, such as, but not limited to, a section, bolt (short length, less than eight feet), or tree length.

**Log:** A book in which navigation, safety, and fish records are kept on a vessel.









**Log Dump:** An area in which logs are removed from a truck or rail car. May be either dry land or water.

**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.
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**M**

			<b>Media Advocacy:</b> A strategic use of multiple media outlets intended to inform or influence a social change or public policy initiative.
			<b>Migrant Farm worker:</b> 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.
			<b>Minimum Data Set:</b> Pre-determined, basic types of information collected consistently on all injury cases.
			<b>Machine:</b> 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.
			<b>Mainline (Yarding):</b> The line that moves the turn of logs toward the yarder in any given system.
			<b>Mechanized Felling:</b> Felling of standing timber by a self-propelled, mobile-wheeled or tracked machine equipped with a shear or other powered cutting device.


















**N**

			<b>NRTL (Nationally Recognized Testing Laboratory):</b> 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.
			<b>Nonfamily Farms:</b> Farms organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers. Also includes farms held in estates or trusts.
			<p><b>North American Industry Classification System (NAICS):</b> 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.</p> <p><b>NAICS 11 Agriculture, Forestry, Fishing and Hunting:</b> 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.</p> <p><b>111 Crop Production:</b> 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.</p> <p><b>112 Animal Production:</b> 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.</p>
























		<p><b>113 Forestry and Logging:</b> Industries in the Forestry and Logging subsector grow and harvest timber on a long production cycle (i.e., of ten 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 ten years, are classified in the Crop Production subsector.</p> <p><b>114 Fishing, Hunting and Trapping:</b> 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.</p> <p><b>115 Support Activities for Agriculture and Forestry:</b> 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.</p>
		<b>North Pacific Fishing Vessel Owners Association (NPFVOA):</b> A non-profit organization that conducts training and produces education materials to commercial fishermen based in Seattle.
		<b>NVIC 5 (Navigation and Inspection Circular 5):</b> Coast Guard list of voluntary fishing vessel safety recommendations from 1987.








O


		<b>OPS (Operator Protective Structure):</b> 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.
	 	<b>Occupational Disease:</b> A disease caused by exposure to environmental factors associated with employment.
	 	<b>Occupational Illness:</b> Any abnormal physical condition or disorder, other than one resulting from occupational injury, caused by exposure to environmental factors associated with employment.
	 	<b>Occupational Injury:</b> An injury suffered by a person arising out of and in the course of employment involving a single incident in the work environment.
	 	<b>OSHA (Occupational Safety and Health Act):</b> An agency of the U.S. Department of Labor that was created to prevent work-related injuries, illnesses, and deaths by issuing and enforcing rules (called standards) for workplace safety and health.
	 	<b>OSHA Recordable Injury:</b> Work-related injuries and illnesses which result in death, loss of consciousness, days away from work, restricted work activity or job transfer, or medical treatment beyond first aid. See Code of Federal Regulations Part 1904 for more details.
		<b>Outrigger:</b> Poles or booms on either side of a vessel from which stabilizers or fishing gear can hang from.

P



			<b>Paid Firefighter:</b> Any employee whose primary duty is fire suppression and control of fires.
			<b>Pass Line:</b> A small line threaded through a block at or near the top of a wood tree or metal tower to assist the high climber.
			<b>Permanent Disability:</b> A permanent impairment of a bodily function or loss of use of a body part due to an occupational injury or illness; an enduring nonfatal physical or mental impairment as a result of an injury that prevents or restricts normal achievement.
			<b>Permanent Partial Disability:</b> 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.
			<b>Permanent Total Disability:</b> Nonfatal 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 in 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.
			<b>Personal Protective Equipment (PPE):</b> Any material or device worn to protect a person's head, body, feet and extremities from exposure to or contact with any harmful substance or form of energy. Commonly-used PPE includes steel-toed shoes, gloves, safety goggles, sunscreen, ear plugs, and respiratory masks.
			<b>Port:</b> Left side of the vessel when facing forward.
			<b>Potential Failure Zone:</b> 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.
			<b>Pots:</b> 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.
			<b>Prescribed Fire:</b> Any fire burning under predetermined conditions to meet specific objectives related to fuels reduction or habitat improvement.
			<b>Production Agriculture:</b> 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. Includes only NAICS subsectors 111 and 112.
			<b>PTO (Power Take-Off):</b> An external shaft on the front or rear of the tractor to provide rotational power to implements.
			<b>Purse Seines:</b> 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.

**Q**

			<b>Qualified First Aid Person:</b> An individual possessing evidence to show valid first aid and CPR training within the last two years.
			<b>Qualified Person:</b> A person who has: <b>(a)</b> a recognized degree, certification, professional standing, knowledge, training or experience; or <b>(b)</b> successfully demonstrated the ability to perform the work, solve or resolve problems relating to the work, subject matter, or project.
			<b>Quarter:</b> The port or starboard stern of a vessel.


































		<b>Quartering Seas:</b> Seas taken on one of the vessel's quarters.
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**R**







		<b>Reach:</b> Usually a rectangular steel tube which slides in the trailer tunnel and is used as a connection between a log truck and the trailer.
		<b>Reforestation:</b> 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.
		<b>Regional Fishery Management Councils:</b> 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).
	 	<b>Research:</b> A systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Research may consist of systematic empirical observation or hypothesis testing.
		<b>Reserve Buoyancy:</b> Watertight compartments which positively affect buoyancy.
	 	<b>Restricted Activity:</b> The inability to perform normal activities; a change in work performance as a result of an injury.
		<b>Righting Arm:</b> The tendency of a vessel to right itself when an outside force such as wind or seas acts on it.
	 	<b>Risk:</b> A measure of the combined probability and severity of possible harm; mathematically, risk is the product of probability X severity.
	 	<b>Risk Acceptance:</b> The acceptance by an individual or organization of a level or degree of risk identified as the possible consequence of a course of action.
	 	<b>Risk Assessment:</b> The process of determining the degree of threat that is posed by one or more hazards.
	 	<b>Risk Control:</b> The process of minimizing unwanted loss by anticipating and preventing the occurrence of unplanned events.
	 	<b>Risk Evaluation:</b> 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.
	 	<b>Risk Management:</b> The professional assessment of all loss potential in an organization's operations leading to establishment and administration of a comprehensive loss control program.
	 	<b>Risk Perception:</b> The subjective assessment of the probability of a specified type.
	 	<b>ROPS (Roll-Over Protective Structure):</b> A cab or frame certified for the protection of operators of agricultural tractors, forestry and construction equipment to minimize the possibility of serious operator injury resulting from accidental upset. The most protection is provided operators when they buckle the accompanying seat belt.
		<b>Root Wad:</b> The root ball and dirt that is pulled from the ground when a tree or stump is uprooted.
		<b>Rub Rails:</b> The guard on the outside of a vessel which protects it from rubbing on a piling, dock, other vessel, etc.
		<b>Rub Rails:</b> Guarding on the exposed sides of elevated bridges, ramps or runways to prevent wheeled equipment from going over the edge.
		<b>Rub Tree:</b> A tree used to guide a turn around a certain area.
		<b>Runner:</b> A person who delivers supplies, materials or relays information.
		<b>Running Line:</b> Any moving line in a cable yarding system.
	 	<b>Runover:</b> A categorical variable of injury that occurs when agricultural or forestry machinery, mobile equipment, or vehicle physically runs over a victim.

**S**





















			<b>Safety (Lay Person):</b> Freedom from those conditions that can cause danger, risk, or injury.
			<b>Safety (Professional):</b> The control of recognized hazards to achieve an acceptable level of risk.
			<b>Safety Factor:</b> The ratio of breaking strength to safe working strength or load.
			<b>Safety Pin (Shackle):</b> A threaded shackle pin secured by a nut that is secured with a cotter key, latchpin or molly.
			<b>Safety Swede:</b> A device that is designed for the specific purpose of making a positive connection to binders that are being closed (tightened) or opened.
			<b>Safety Zone:</b> 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, man-made or natural rocky area that is large enough and sufficiently devoid of fuels to take refuge without being burned.
			<b>SCBA (Self-Contained Breathing Apparatus):</b> A device worn to provide breathable air in a hostile environment. It has three main components: a high-pressure tank, a pressure regulator, and an inhalation connection (mouthpiece or mask) connected together and mounted to a carrying frame.
			<b>Sea Chest:</b> A space where a number of through-hull fittings pass through the hull of a vessel.
			<b>Seasonal Farm worker:</b> An individual whose principle employment is in agriculture on a seasonal basis, who has been so employed in the last 24 months.
			<b>Seine Nets:</b> Very long nets used to surround fish. They can be operated from the shore (beach seines) or from a vessel.
			<b>Seiner:</b> Mid-size vessel with five to six crew that move a seine net in a circle in an area near surface to capture salmon, herring, and tuna.
			<b>Seine Skiff:</b> Metal skiff with powerful engine that moves seine net in circle to enclose fish.
			<b>Serviceable Condition:</b> That quality of a tool, machine, vehicle, equipment, or other device to operate as it was designed and intended to be operated by the manufacturer.
			<b>Set Net (Gillnet):</b> 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.
			<b>Sheave:</b> Roller, usually hydraulic, which fishing gear line passes through to bring onboard.
			<b>Sheave (Block):</b> Roller within a housing that passes line or cable while supporting it or changing direction.
			<b>Short Log (Chunks):</b> Any log or fiber less than 27 feet long.
			<b>Shot:</b> Length of anchor chain or line. Generally 15 fathoms in length if anchor chain.
			<b>Single Jack:</b> One cutter, in an area or portion of standing timber, who falls and bucks.
			<b>Single Tree Intermediate Support System:</b> 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.
			<b>Siwash (Intentional):</b> 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.
			<b>Siwash (Unintentional):</b> 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.
			<b>Siwash:</b> A northwest coast term that generally indicates an unintended consequence, such as having to spend an unplanned night on an island or in the woods. Of Northwest Native American origin.






			<b>Skate:</b> Length of longline 1800 feet long.
			<b>Skidder:</b> A self-propelled machine, of the wheel or crawler design, or an animal used to move logs or trees to a landing.
			<b>Skidding:</b> The movement of logs or fiber on the surface of the ground toward the place where they can be further processed or loaded.
			<b>Skyline:</b> The line which is hung between two or more supports on which a carriage or block travels.
			<b>Slackline:</b> 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.
			<b>Slack line:</b> Any line without a load.
			<b>Slash burning:</b> The use of prescribed fire as a method of forest management.
			<b>Slope (grade):</b> 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.
			<b>Smart clothing:</b> Personal protective clothing with bio-feedback capability.
			<b>Snag (Forestry):</b> Any standing dead tree or portion thereof.
			<b>Snag (Fishing):</b> A hangup of gear on the bottom.
			<b>Snubbing:</b> Retarding or controlling the movement of logs or machines by attachment to another vehicle or stationary object.
			<b>Social Marketing:</b> The planning and implementation of programs designed to bring about social change using concepts from commercial marketing.
			<b>Source of Injury--Primary:</b> The source of injury or illness identifies the object, substance, bodily motion, or exposure which <i>directly produced or inflicted</i> the previously identified injury or illness. May also be referred to as the <i>primary</i> source of injury.
			<b>Source of Injury--Secondary:</b> Identifies the object, substance, or person that <i>generated</i> the source of injury or illness or that <i>contributed to</i> the event or exposure.
			<b>Spring Pole:</b> A tree, segment of a tree, limb, or sapling which is under stress or tension due to the pressure or weight of another object.
			<b>Square Lead:</b> 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.
			<b>SSB (Single Side Band):</b> Marine radio with a range of hundreds of miles.
			<b>Stabilizers (“Birds” on East Coast; “Stabies”):</b> Winged metal pieces that extend from outriggers or poles and ride just below the surface of the water to give vessels a smoother ride.
			<b>Stability:</b> The capacity of a machine, vehicle or vessel to return to equilibrium or to its original position after having been displaced.
			<b>Stability Baselines:</b> 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.
			<b>Stand-on Vessel:</b> A vessel due to its relationship to another that is deemed to maintain its course and speed to avoid a collision
			<b>Starboard:</b> Right side of the vessel when looking forward.
			<b>Station Bill:</b> A list of emergency assignments for all crewmembers.
			<b>Stern Ramp:</b> The ramp in the stern of a trawler for shooting and retrieving the net.
			<b>Strip:</b> A stand of timber or area of fallen and bucked timber in a predetermined location on which employees work in a planned pattern.
			<b>Supervisory Personnel:</b> 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.
			<b>Surveillance:</b> The ongoing systematic collection of outcome-specific data for use in planning, implementation and evaluation of public health practice.
			<b>Swede Connection:</b> 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.
			<b>Swing Cut:</b> A back cut in which the holding wood on one side is cut through.
			<b>Swing Radius:</b> The 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**

			<b>Tail Hold:</b> An anchor used for making fast any line or block other than a guyline.
			<b>Tail Tree:</b> The tree at the opposite end from the landing area on which rigging is hung.
			<b>Tender (Fish Packer):</b> A larger vessel that carries the catch of smaller vessels to a processing plant.
			<b>Territorial Sea:</b> A regulatory line that extends three to twelve miles out from shore.
			<b>Through-Hull Fitting:</b> A connection, usually a pipe or a hose, from the hull to the outside. These can be below or above the water.
			<b>Tight Line:</b> When a force is exerted on both main line and haulback at the same time.
			<b>Timber Cutting:</b> The falling and/or bucking of trees by hand or mechanical means.
			<b>Topping:</b> Cutting off the top section of a standing tree prior to rigging the tree for a spar or tail tree.
			<b>TOPS (Tip-Over Protective Structure):</b> A cab or frame designed and certified 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. The most protection is provided operators when they buckle the accompanying seat belt.
			<b>Traumatic Injury:</b> See definition under Census of Fatal Occupational Injury.
			<b>Trawls:</b> 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.
			<b>Trawler:</b> Vessels which drag nets behind them to catch fish. These nets can be dragged along the bottom (bottom trawl) or mid-water.
			<b>Trawl Door:</b> Metal door shaped weighs which sink the trawl net and open it.
			<b>Turn:</b> 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.
			<b>Turtle Excluder Devices (TEDs):</b> 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**

			<b>Undercut (Face):</b> A notch cut in a tree to guide the direction of the tree fall and help prevent splitting or kickback.
			<b>Undocumented Worker:</b> a common term referring to an immigrant or migrant who is employed or remunerated for services without legal authorization
			<b>U.S. Marine Safety Association (USMSA):</b> A non-profit group of marine safety equipment manufacturers.

**V**



		<b>V-lead:</b> 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.
	 	<b>Vehicle:</b> 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.
		<b>VHF (Very High Frequency) Radio:</b> Marine radio with a range of about 20 miles at sea.
	 	<b>Volunteer Firefighter:</b> A person who performs or offers to perform a service voluntarily, such as suppression and control of fires.
	 	<b>Vulnerable Populations:</b> Groups that have limited ability to safeguard their own needs and interests or to seek protections or resources. Normally includes groups associated by: extremes in age (young, old), gender, limited-English language, mobility and migration, disability, socio-economic status, documentation status (e.g., immigrant work visa), ethnicity and culture.

**W**

		<b>Watcher/Firewatch:</b> A person who visually observes the area on which operation activity occurred for the out-break of fire.
		<b>Wildcat:</b> The sprocket wheel on a windlass that engages the anchor chain as it is being hauled in.
		<b>Wildland Fire:</b> Any non-structure fire, other than prescribed fire, that occurs in the wildland.
		<b>Wildlands Fire Fighting:</b> 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.
		<b>Wildlife Tree:</b> 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.
	 	<b>Winching:</b> The winding of cable or rope onto a spool or drum.
		<b>Within the Stakes:</b> When the log center is below the top of the stakes.
	 	<b>Work Area:</b> Any area frequented by employees in the performance of assigned or related duties.
	 	<b>Work-Related:</b> See definition of work-relationship under Census of Fatal Occupational Injury.
	 	<b>Work-Related Musculoskeletal Disorders (WMSD):</b> Injuries or illnesses of muscles, tendons, joints, and nerves caused or aggravated by work.
		<b>Wrapper (Tie Down):</b> A chain, cable, steel banding, synthetic rope or fiber webbing assembly used to contain a load of logs.

**X**

**Y**

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

**Z**

Source: National Institute for Occupational Safety and Health  
 National Occupational Research Agenda (NORA)  
 Agricultural, Forestry and Fishing Sector Council

For suggested additions to this Dictionary of Terms send an email to Dennis Murphy at [djm13@psu.edu](mailto:djm13@psu.edu).

For more information or questions about the AgFF Strategic Plan, please go to the website at <http://www.cdc.gov/niosh/nora/councils/agff/default.html> or contact the Sector Coordinator at [BHusberg@cdc.gov](mailto:BHusberg@cdc.gov) .