

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

TABLE OF CONTENTS

Topics	Sections
<u>OVERVIEW</u>	10.1 What is the purpose of this chapter? 10.2 What is the scope of this chapter? 10.3 What are the authorities for this chapter? 10.4 What terms do you need to know to understand this chapter?
<u>RESPONSIBILITIES</u>	10.5 Who is responsible for temperature stress prevention?
<u>GENERAL TEMPERATURE STRESS PREVENTION AND RESPONSE</u>	10.6 How can the Service reduce the risk of temperature-related injuries and illnesses? 10.7 What should employees do if they become ill due to temperature exposure, or they observe a colleague becoming ill? 10.8 What about hydration? 10.9 Can Project Leaders/supervisors use station funds to buy water to prevent dehydration? 10.10 Can Project Leaders/supervisors use station funds to buy electrolyte/sports drinks? 10.11 Do employees need to wear a uniform when working in hot or cold temperatures? 10.12 Can Project Leaders/supervisors use appropriated funds to purchase temperature-appropriate clothing and apparel for employees?
<u>HEAT STRESS SPECIFICS</u>	10.13 How can the Service reduce the risk of heat stress? 10.14 What are heat stress risk factors and protective measures? 10.15 How do workers acclimatize to hot weather? 10.16 What are appropriate work/rest cycles? 10.17 What clothing is recommended for working in hot weather? 10.18 What is rhabdomyolysis? 10.19 Where can employees find more information on heat stress?
<u>COLD STRESS SPECIFICS</u>	10.20 What are cold stress risk factors and protective measures? 10.21 What clothing is recommended for working in cold weather? 10.22 Where can employees find more information on cold stress?

OVERVIEW

10.1 What is the purpose of this chapter? This chapter provides guidance and information on the effects of heat and cold temperature stress and assigns responsibilities to reduce the risk of temperature-related injuries and illnesses within the U.S. Fish and Wildlife Service (Service).

10.2 What is the scope of this chapter? This chapter applies to all employees, volunteers with a signed Volunteer Service Agreement ([Optional Form \(OF\) 301A](#)), seasonal workers, and students whose duties require them to work in areas and environments where temperature extremes may affect their safety and health.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

10.3 What are the authorities for this chapter?

- A. Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters ([29 CFR 1960](#)).
- B. Department of the Interior [Occupational Medicine Program Handbook](#).
- C. [Executive Order 12196](#), Occupational Safety and Health Programs for Federal Employees.
- D. National Institute for Occupational Safety and Health, [Occupational Exposure to Heat and Hot Environments, Revised Criteria 2016](#).
- E. Occupational Safety and Health Act of 1970, [General Duty Clause, Sec. 5\(a\)\(1\)](#), and [Sec. 19, Federal Agency Safety Programs and Responsibilities \(29 U.S.C. 654 and 668\)](#).
- F. [Threshold Limit Values \(TLV\) and Biological Exposure Indices \(BEI\), Documentation of the TLVs for Chemical Substances and Physical Agents and BEIs, American Conference of Governmental Industrial Hygienists](#).

10.4 What terms do you need to know to understand this chapter?

- A. **Acclimation/acclimatization** is the gradual adaption to a different thermal environment. It normally takes an average of 7 to 14 days for a person unaccustomed to a hot environment to physiologically “adjust” to the warmer temperatures.
- B. **Chilblains** is a condition caused by the repeated exposure of skin to cool temperatures without the opportunity to warm up long or often enough to allow the skin to recover. The repeated or prolonged exposure to cooler-than-normal temperatures causes damage to the capillary beds (the groups of small blood vessels) in the skin. In chilblains, this damage is permanent, and the redness and itching will return with additional exposure to the cold. Temperatures that may cause chilblains range from just above freezing to as high as 60° Fahrenheit (F).
- C. **Dehydration** is a condition where the body does not have as much water and other fluids as it should. It can be caused by excessive sweating or urine output, fever, vomiting, or diarrhea. Dehydration can lead to heat-related and cold-related injuries and illnesses.
- D. **Frostbite** is a condition that occurs when skin or other tissues freeze, most commonly involving the nose, ears, cheeks, chin, fingers, or toes. Frozen (or frostbitten) skin or other tissue loses feeling and normal color. The tissue damage is generally permanent, and the affected area/digit/limb may need to be amputated. Individuals with poor blood circulation are at a higher risk of frostbite and other forms of cold damage since their self-warming capability is limited.
- E. **Heat cramps** happen when individuals sweat a lot during strenuous activity. The sweating depletes the body’s salt and moisture levels, and low salt levels in muscles cause painful cramps. Heat cramps may also be a symptom of heat exhaustion.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

F. Heat exhaustion is the body's response to an excessive loss of water and salt, usually through sweating. The elderly and people with high blood pressure, those working in hot environments, and those who don't properly hydrate are most prone to heat exhaustion. A good way to determine if an individual is becoming dehydrated is by the volume and color of their urine. Low urine volume that is dark in color may signal dehydration.

G. Heat index is the scientific relationship between air temperature and the relative humidity. The higher the heat index, the hotter the weather feels since sweat does not rapidly evaporate and cool the skin.

H. Heat stroke is the most serious heat-related illness. **HEAT STROKE IS A MEDICAL EMERGENCY.** It occurs when the body becomes unable to control its temperature. The body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if the person doesn't get medical treatment.

I. Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or when suddenly rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

J. Hypothermia is an abnormally low body temperature caused by exposure to cold for a long period of time where the body loses its ability to keep itself warm. Because of its effect on the brain, hypothermia may cause unclear thinking, which increases the risk of harm because the victim may not be able to protect him/herself and resolve the problem of exposure.

K. Rhabdomyolysis (often called rhabdo) is a medical condition resulting from the breakdown of damaged muscle tissue. If not recognized and treated early, it can cause permanent disability and may be fatal. Two risk factors for developing rhabdomyolysis are dehydration and over exertion.

RESPONSIBILITIES

10.5 Who is responsible for temperature stress prevention? See Table 10-1.

Table 10-1: Responsibilities for Preventing Temperature Stresses

This official...	Is responsible for...
A. The Director	Ensuring that we maintain an effective and comprehensive occupational safety and health program.
B. The Assistant Director – Business Management and Operations	Ensuring: (1) We have a policy on temperature-related injury and illness prevention; and (2) That the Chief, Division of Safety and Health, has sufficient support and resources to accomplish assigned responsibilities.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Occupational Safety and Health

Part 242 Industrial Hygiene

Chapter 10 Temperature Stress Prevention

242 FW 10

This official...	Is responsible for...
C. Directorate Members	Ensuring that there are sufficient resources and support in place to implement effective and comprehensive temperature stress prevention within their areas of responsibility.
D. The Chief, Division of Safety and Health	<p>(1) Revising and updating this chapter, as necessary; and</p> <p>(2) Interpreting the requirements in this chapter and serving as a consultant to resolve Servicewide questions or issues.</p>
E. Regional and Headquarters (HQ) Safety Managers	<p>(1) Interpreting temperature stress prevention methods and serving as advisors to resolve Regionwide/HQ questions or issues;</p> <p>(2) As requested, interpreting temperature stress prevention measures for Project Leaders, supervisors, Collateral Duty Safety Officers, and employees;</p> <p>(3) As requested, providing technical assistance to developers and approvers of risk assessments and Job Hazard Assessments (JHA) for operations occurring under hazardous temperature conditions; and</p> <p>(4) Evaluating the implementation of this chapter during Regional/HQ field station safety evaluations.</p>
F. Project Leaders and Supervisors	<p>(1) Ensuring that workers who are potentially exposed to hazardous temperatures are aware and trained on the prevention, signs, symptoms, and first aid procedures related to heat or cold stress injuries and illnesses;</p> <p>(2) Developing risk assessments and JHAs for tasks where workers may be exposed to hazardous heat or cold temperatures. Risk assessments and JHAs must describe associated hazards, necessary clothing and Personal Protective Equipment (PPE), and preventive procedures (see 240 FW 1, Safety Program Management);</p> <p>(3) Ensuring workers have the appropriate clothing and PPE based on a certified JHA for the work activities involved and are trained on its selection, use, and maintenance;</p> <p>(4) Monitoring the National Weather Service's (NWS) Heat Index during hot weather and its Wind Chill Chart during cold weather and taking appropriate actions to keep workers safe;</p> <p>(5) Ensuring workers have a means of shelter from hazardous heat or cold temperatures that allows them to rest and recoup before returning to work;</p> <p>(6) Ensuring workers drink adequate amounts of water or other fluids for bodily fluid replenishment; and</p>

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

This official...	Is responsible for...
	<p>(7) Ensuring that temperature-related injuries and illnesses are entered into the Department of the Interior's Safety Management Information System (SMIS).</p>
G. Employees	<p>(1) Being familiar with the hazards associated with working in hot or cold temperatures, including signs, symptoms, and first aid response for temperature-related injuries and illnesses;</p> <p>(2) Complying with the control measures in the risk assessment and JHA for the work they are doing; and</p> <p>(3) Reporting any adverse health effects related to hazardous temperature exposure to their Project Leader/supervisor as soon as possible.</p>

GENERAL TEMPERATURE STRESS PREVENTION AND RESPONSE

10.6 How can the Service reduce the risk of temperature-related injuries and illnesses?

The key to reducing the risk is advanced planning using risk management and training on prevention, signs, symptoms, and first aid procedures. There are specific sections with information on [heat stress](#) and [cold stress](#) later in this chapter.

A. Hazard Assessment. Project Leaders/supervisors or their designees must conduct an assessment of field task hazards using risk management, including assessing a task's risk and identifying mitigation methods for the hot or cold conditions and other hazards. To work in extreme temperature conditions, the Project Leader/supervisor must develop a plan that describes how field personnel, duty station personnel, and local emergency services can communicate. The plan must include the following:

- (1)** Names of personnel working in the field;
- (2)** Field work locations;
- (3)** Phone numbers for personnel, duty station, and local emergency services; and
- (4)** Established check-in periods.

B. Training.

(1) The Project Leader/supervisor must ensure that personnel who need to work in hot or cold environments are trained on preventing illness or injury, recognizing the signs and symptoms of illness or injury, and using first aid procedures associated with temperature stress-related conditions.

(2) Training must consist of a review of:

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

- (a) The risk assessment and control measures, and
- (b) This chapter and Exhibit 1 for heat stress or Exhibit 2 for cold stress.

(3) Videotapes and other methods of communicating relevant information can be used to supplement the risk assessments, this chapter, and the exhibits. There is no need for formal or complex training—informal, “toolbox” meetings are appropriate. The National Conservation Training Center has a self-study online course, [CSP3122, Heat Stress](#).

10.7 What should employees do if they become ill due to temperature exposure, or they observe a colleague becoming ill? There are many signs and symptoms associated with temperature-related injuries and illnesses. Timely recognition and treatment can mean the difference between a minor health impact and death. Exhibit 1 describes the signs and symptoms of heat-related injuries and illnesses. Exhibit 2 describes the signs and symptoms of cold-related injuries and illnesses.

A. If you develop signs or symptoms of temperature-related injury or illness:

(1) If possible, take the first aid steps we describe in Exhibit 1 for heat-related conditions or Exhibit 2 for cold-related conditions and alert a fellow worker. Ask for help.

(2) Contact emergency medical services, if necessary.

(3) Notify your Project Leader/supervisor:

(a) Your Project Leader/supervisor must officially report the injury or illness using the [Department of the Interior's SMIS](#).

(b) You may file a worker's compensation claim in SMIS, particularly if you incur medical expenses or lose time at work due to the injury or illness (see [240 FW 10](#), Workers' Compensation Program, for details).

B. If you observe a fellow worker who exhibits signs or symptoms of temperature-related injury or illness:

(1) Do what you can to give the person the first aid we describe in Exhibit 1 or 2, and

(2) If the person is incapacitated, immediately seek emergency medical services and ensure the Project Leader/supervisor is aware of the issue.

10.8 What about hydration?

A. When working in hot or cold environments, your body can sweat and expel water and salts. Maintaining a proper balance of water and electrolytes is very important.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Occupational Safety and Health

Part 242 Industrial Hygiene

Chapter 10 Temperature Stress Prevention

242 FW 10

B. To maintain good hydration, workers should drink small amounts of water frequently and before becoming thirsty. The ideal drinking water temperature is 50°F to 60°F. Workers who have been in the heat for up to 2 hours and involved in moderate work activities should drink a cup (8 ounces) of water or other fluids every 15-20 minutes.

10.9 Can Project Leaders/supervisors use station funds to buy water to prevent dehydration?

A. Yes. The Occupational Safety and Health Administration (OSHA) views it as the employer's responsibility to provide potable water to employees, so we are required to provide drinking water at all times and can use station funds to do so. For field work, you can provide water in bottles or coolers.

B. If water is provided in coolers, Project Leaders and supervisors must ensure that the cooler is kept clean and is safe for dispensing drinking water. They must be cleaned at the end of each work week, or more frequently if necessary. To clean and sanitize coolers or other portable water storage containers:

(1) Wash the container with dishwashing soap and water and rinse completely with clean water.

(2) Sanitize the container with a solution made by mixing 1 teaspoon of unscented liquid household chlorine bleach in one quart of water.

(3) Cover the container and shake it well so that the sanitizing bleach solution touches all inside surfaces of the container.

(4) Wait at least 30 seconds and then pour the sanitizing solution out of the container.

(5) Let the empty sanitized container air-dry before use or rinse the empty container with clean water.

C. Project Leaders and supervisors need to ensure that any ice machines at the facility are cleaned and sanitized according to the manufacturer's instructions. Cleaning and sanitizing must be done at least quarterly. Ice scoops should be washed daily.

10.10 Can Project Leaders/supervisors use station funds to buy electrolyte/sports drinks?

A. Yes, but only under limited circumstances. In general, unless an individual is deficient in sodium and other electrolytes, increased intake of electrolyte drinks during exertion is unlikely to help prevent heat illness. If workers are eating regular meals and snacks, and adequately hydrating with water, they are generally able to replace electrolytes lost through sweating.

B. When workers generate prolonged sweat for several hours, we should provide them with electrolyte/sports drinks. Two quarts of an electrolyte-rich beverage can be consumed in place of 2 quarts of daily water. The concentration of electrolytes/carbohydrates must not exceed 8% by volume.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

C. Wildland fire personnel must follow the process outlined in the National Wildfire Coordinating Group's (NWFC) [Interagency Incident Business Management Handbook](#).

10.11 Do employees need to wear a uniform when working in hot or cold temperatures?

A. For safety reasons, Project Leaders/supervisors may make an exception to their employees wearing uniforms. Approved safety or foul weather gear can be substituted for or added to the full uniform (see [041 FW 4](#)).

B. The uniform catalog offers a number of weather-appropriate uniform items. Examples include quick dry pants and shirts with mesh vents and an Ultraviolet Protection Factor (UPF) rating, Gore-Tex® rain/wind pants, and moisture-wicking turtlenecks.

10.12 Can Project Leaders/supervisors use appropriated funds to purchase temperature-appropriate clothing and apparel for employees? It depends. Generally, clothing and apparel is considered a personal expense so using Government funds for purchases is not allowed.

A. There are exceptions to this:

(1) *Protective clothing under OSHA*. If an assessment of the work environment determines hazards are present, then appropriated funds can be used to purchase PPE. This requires the completion of a written JHA (see [241 FW 3](#)).

(2) *Special clothing for hazardous occupations*. If the following conditions are met, Project Leaders/supervisors may use appropriated funds for special clothing:

(1) The item must be "special" and not part of the ordinary and usual furnishings we expect an employee to provide for himself or herself;

(2) The item must be for the benefit of the Government, which means it must be essential to the safe and successful accomplishment of the work; and

(3) The employee must be engaged in hazardous duty.

B. See [041 FW 4](#) for who receives a uniform allowance and how much it is.

HEAT STRESS SPECIFICS

10.13 How can the Service reduce the risk of heat stress? Important ways to reduce heat exposure and the risk of heat-related injuries and illnesses include engineering controls (e.g., air conditioning and ventilation) that make the work environment cooler, and work practices (e.g., scheduling work during a cooler time of the day, allowing frequent breaks, reminding workers to drink water, providing an opportunity for workers to build up a tolerance to working in the heat). Workers who may be exposed to hazardous heat must be trained on the workplace conditions

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Occupational Safety and Health

Part 242 Industrial Hygiene

Chapter 10 Temperature Stress Prevention

242 FW 10

that can lead to heat stress, the signs and symptoms of heat stress, and what to do to help those who are affected.

10.14 What are heat stress risk factors and protective measures? Workers are exposed to two forms of heat stress—internal metabolic (body) heat generated by exertion (physical labor) and environmental heat arising from working conditions.

A. Some factors that you should consider regarding the effects of exertion and heat stress include:

- (1) Physical demands of the job or tasks;
- (2) Total length of time a worker is engaged in the activity;
- (3) Temperature and humidity of the work environment;
- (4) Type of PPE and clothing that commonly is or must be used;
- (5) Other hazards associated with the job;
- (6) Ergonomics of the task;
- (7) Other tasks being concurrently accomplished;
- (8) Skill and training of the worker performing the task;
- (9) Workers' physical and aerobic conditioning;
- (10) Workers' personal factors that contribute to heat stress susceptibility like unhealthy diet, obesity, and alcohol consumption;
- (11) Availability of assistance from coworkers or mechanical devices to reduce the amount of effort necessary; and
- (12) Workers' perceptions of how much strain or effort is necessary.

B. Project Leaders/supervisors should monitor the [NWS Heat Index](#) (see Exhibit 1). The heat index is a tool for making decisions about protecting workers in hot weather. OSHA has modified the NWS Heat Index risk levels for use on work sites (see Table 10-2). Certain conditions can contribute additional risk (e.g., physical exertion, working in the direct sun, wearing heavy clothing, etc.), so consider taking steps at the next higher level to protect workers when they will encounter such conditions.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Table 10-2: Heat Index Levels and Protective Measures

Heat Index	Risk Level	Protective Measures
Less than 91°F	Low	<ul style="list-style-type: none"> (1) Provide drinking water, (2) Ensure that adequate medical services are available, (3) Plan ahead for times when the heat index is higher, (4) Encourage workers to wear sunscreen, and (5) Acclimatize workers.
91°F to 103°F	Medium	<p>In addition to the steps listed above:</p> <ul style="list-style-type: none"> (1) Remind workers to drink water often; (2) Review heat-related topics with workers, such as how to recognize heat-related injury or illness, how to prevent them, and what to do if someone gets sick; (3) Schedule frequent breaks in a cool, shaded area; (4) Set up a buddy system to watch workers for signs of heat-related injury or illness; (5) Schedule activities at a time when the heat index is lower; and (6) Develop work/rest schedules.
103°F to 115°F	High	<p>In addition to the steps listed above:</p> <ul style="list-style-type: none"> (1) Alert workers of high risk activities; (2) Actively encourage workers to drink plenty of water; (3) Limit physical exertion (e.g., use mechanical lifts); (4) Have a person at the work site who is well-informed about heat-related injuries and illnesses and can determine appropriate work/rest schedules; (5) Adjust work activities (e.g., reschedule work, pace/rotate jobs); (6) Use cooling techniques; and (7) Watch/communicate with workers at all times.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Heat Index	Risk Level	Protective Measures
Greater than 115°F	Very High to Extreme	<p>In addition to the steps listed above:</p> <p>(1) Reschedule non-essential activity for days with a reduced heat index or to a time when the heat index is lower;</p> <p>(2) Move essential work tasks to the coolest part of the work shift. Consider earlier start times, split shifts, or evening and night shifts;</p> <p>(3) Do not plan strenuous work tasks and those requiring the use of heavy and non-breathable clothing or impervious chemical protective clothing; and</p> <p>(4) If essential work must be done in spite of the heat, in addition to the steps listed above:</p> <ul style="list-style-type: none"> (a) Alert workers of extreme heat hazards, (b) Establish a water drinking schedule, (c) Develop and enforce work/rest schedules, (d) Conduct physiological monitoring (e.g., pulse, temperature, etc.), and (e) Stop work if essential control methods are inadequate or unavailable.

10.15 How do workers acclimatize to hot weather? Individual susceptibility to heat-related injuries and illnesses may vary widely among workers. Workers become gradually acclimatized when exposed to hot conditions for several weeks and are better able to perform work with less strain and distress.

A. When the heat index is high, take special precautions to protect un-acclimatized workers while they adjust, particularly on the first few days on the job.

B. New workers who have not acclimatized to the climate and workers who have been away from work for an extended period of time (1 week or more) and not exposed to heat illness conditions should be gradually acclimated to the environment to prevent heat stroke. This can be achieved by starting with 20% of the workload on the first day, and increasing incrementally by no more than 20% each subsequent day. This may be increased if a combination of controls is used to protect the employee, such as starting work earlier, providing air conditioning, using work rest cycles, or providing shade.

C. During rapid weather changes that lead to excessively hot conditions, even experienced workers should begin on the first day of excessive heat with 50% of the normal workload and

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Occupational Safety and Health

Part 242 Industrial Hygiene

Chapter 10 Temperature Stress Prevention

242 FW 10

time spent in the hot environment, 60% on the second day, 80% on the third day, and 100% on the fourth day.

D. Full acclimatization may take up to 14 days depending on factors related to the environment and the individual, such as risk of heat illness due to certain medications or medical conditions.

10.16 What are appropriate work/rest cycles? Rather than being exposed to high heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work/rest cycles (see Exhibit 1). Work/rest cycles give the body the opportunity to get rid of excess heat, slow down the production of internal body heat, slow down the heart rate, and provide greater blood flow to the skin. During the rest periods, workers may continue to perform mild or light work in a cool place, for example in a lightly air conditioned room, trailer, vehicle, or in full shade.

10.17 What clothing is recommended for working in hot weather? Clothing worn during hot weather work should be light-weight, light-colored, loose fitting, and made of a breathable material such as cotton. Cotton can become uncomfortable after heavy sweating. In these cases, moisture-wicking clothing may be a better alternative since it removes the moisture level against the skin. Employees required to wear PPE while conducting work are at an increased risk of heat stress, especially when wearing semi-permeable (penetrable) or impermeable clothing (e.g., Tyvek® suits, waders, personal flotation devices, etc.).

10.18 What is rhabdomyolysis? Rhabdomyolysis is a potentially life threatening medical condition where muscle tissue rapidly breaks down and leaks into the bloodstream. While rhabdomyolysis is not a heat illness, two risk factors identified for developing rhabdomyolysis include dehydration and overexertion. Heat stress and heat stroke are possible contributing factors. Strenuous activities to which employees are unaccustomed and prolonged exertion put employees at greater risk for developing rhabdomyolysis. You can find information on rhabdomyolysis symptoms and prevention on the Wildland Fire Lessons Learned Center [website](#).

10.19 Where can employees find more information on heat stress? See OSHA's Occupational Heat Exposure [website](#). The Centers for Disease Control and Prevention (CDC) also have detailed information on heat stress available on their [website](#).

COLD STRESS SPECIFICS

10.20 What are cold stress risk factors and protective measures? Cold stress occurs by driving down the skin temperature and eventually the internal body temperature. Project Leaders/supervisors should monitor the [NWS Wind Chill Chart](#) and implement work/warm-up schedules (see Exhibit 2). The wind chill chart calculates the dangers from winds and freezing temperatures.

A. Risk factors:

(1) Wetness/dampness, dressing improperly, and exhaustion;

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

- (2) Predisposing health conditions, such as hypertension, hypothyroidism, and diabetes; and
- (3) Poor physical conditioning.

B. Protective measures:

- (1) Scheduling maintenance and repair jobs in cold areas for warmer months;
- (2) Scheduling cold jobs for the warmer part of the day;
- (3) Dressing properly for the cold;
- (4) Reducing the physical demands of workers;
- (5) Using relief workers or assigning extra workers for long, demanding jobs;
- (6) Staying dry;
- (7) Drinking warm liquids, e.g., warm water with lemon, room temperature water, etc. Avoid drinking tea and coffee as the caffeine constricts blood vessels;
- (8) Providing warm areas for use during break periods; and
- (9) Monitoring workers who are at risk of cold stress.

10.21 What clothing is recommended for working in cold weather?

A. Dressing properly is extremely important for preventing cold stress. The type of fabric worn also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, silk, or certain synthetics retain their insulation value even when wet.

B. Following are recommendations for working in cold environments:

- (1) Layering provides better insulation. Wear at least three layers of loose fitting clothing:
 - (a) An inner layer of wool, silk, or synthetic to keep moisture away from the body;
 - (b) A middle layer of wool or synthetic to provide insulation even when wet; and
 - (c) An outer wind and rain protection layer that allows some ventilation to prevent overheating.
- (2) Wear a hat or hood to help keep your whole body warmer. Hats reduce the amount of body heat that escapes from your head.
- (3) Use a knit mask to cover the face and mouth, if needed.

**FISH AND WILDLIFE SERVICE
OCCUPATIONAL SAFETY AND HEALTH**

Occupational Safety and Health

Part 242 Industrial Hygiene

Chapter 10 Temperature Stress Prevention

242 FW 10

(4) Use insulated gloves to protect the hands (water resistant, if necessary).

(5) Wear insulated and waterproof boots (or other footwear).

10.22 Where can employees find more information on cold stress? See OSHA's online [Cold Stress Guide](#). The CDC also has detailed information on cold stress on their [website](#).

/sgd/ Stephen Guertin
DEPUTY DIRECTOR

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