STRAINS, SPRAINS & PAINS:

Ergonomic Injury Prevention for Commercial Fishermen

POCKET GUIDE TO ERGONOMICS

SECOND EDITION

This Pocket Guide is meant to be kept on your vessel for reference by you and other crew.

AMSEA
Alaska Marine Safety Education Association

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WARNING: The stretching exercises in this booklet should not be attempted if you have a preexisting condition, injury or soreness in an affected area. Stretching should never be done to the point of causing pain. If you are under treatment for a musculoskeletal disorder, you should follow the advice of your medical advisor about practicing these exercises since they can cause further injury. You are encouraged to have your own musculoskeletal assessment conducted by a trained professional who can recommend specific exercises and develop a program for you and your particular work situation. This booklet provides general principles only, it is up to YOU to apply them safely and correctly to the work situation found in your specific fishery.

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Employees have the right to:
1. Working conditions that do not pose a risk of serious harm.
2. Receive information and training (in a language workers can understand) about hazards, methods to prevent harm, and OSHA standards that apply to their workplace.
3. Review records of work-related injuries and illnesses.
4. Get copies of test results done to find and measure hazards in the workplace.
5. File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA rules. When requested, OSHA will keep all identities confidential.
6. Use their rights under the law without retaliation or discrimination. If an employee is fired, demoted, transferred or discriminated against in any way for using their rights under the law, they can file a complaint with OSHA. This complaint must be filed within 30 days of the alleged discrimination. Go to www.whistleblowers.gov for additional information.

Acknowledgements

Special thanks to:

Don Bloswick, Ph.D. of the University of Utah
Paul Columb, B.S.P.T. of Sitka Physical Therapy
Eric Speck, M.S.P.T. of Sitka Physical Therapy
Kay Turner, D.P.T. of Oceanside Therapy Center

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Table of Contents

Overview of Ergonomics

Ergo (meaning work) and *Nomos* (meaning natural laws).

Ergonomics is the science of adapting workstations, tools, equipment and work methods for more efficient, comfortable and error-free use by humans.

Ergonomics has often been associated with working in an office, with keyboards, telephones and fancy ball chairs. The fact is, however, that correct ergonomics is important in nearly every activity we undertake; especially activities and jobs that are physically taxing - like commercial fishing. Anyone who has ever fished, known a fisherman or thought about fishing, knows there are inherent risks, but we usually associate those risks with things like weather, loading our vessels, handling gear, etc. It isn't often we *really* think about the risks to our bodies from repetitive motion, strain on the back, lifting, and other forces that cause injury over time. We know those risks are there, but it's just part of the job, right? Sort of.

Improving ergonomics in commercial fishing practices can help to reduce injury. There are tools, safer practices and simple deck alterations that can dramatically reduce your risk to injury caused by the physical demands of commercial fishing.

As you go through the guide, begin to think about what areas on your vessel could be improved through correct ergonomics. The benefit is not only self-wellness, but often, improved ergonomics creates more efficient practices - which is something every fisherman can appreciate.

This guide is intended to serve as a reference to be kept on board your vessel. It is not intended to treat, diagnose or cure any condition. Please remember to always consult your physician for any medical concerns you may have.

Forces on the Body

BACK & SPINE

Low-back stresses are due to force and posture and effort repetition/effort duration. In commercial fishing in particular, effort duration is much greater than that of a typical job because the shift is longer. Fishermen don't punch in and punch out, they work by the tides, fishing regs and other factors. Additionally, they work in often confined and cramped spaces, and on a surface that is moving with the water.

When thinking about injuries specific to the back, we must consider several factors:

1. The weight/size and direction of the load or force on the hands.
2. The posture assumed during the material handling activity (including the twisting of the body and the horizontal distance of the load out from the body).
3. The frequency of the force.
4. The duration of the activity.
5. Fixed or stationary postures.

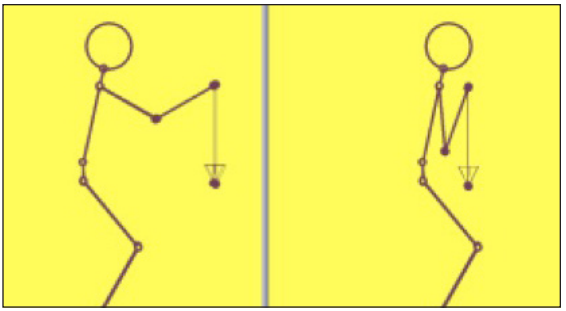
Potential stress from high force.

Potential stress from posture.

Potential stress from force AND posture.

Compressive force on the spine is something that should also be considered. Lifting and lowering loads put compression on the spine. While the National Institute for Occupational Safety and Health (NIOSH) tells us to try to avoid lifting more than 35 pounds at once, and especially if frequent and of long duration, we know this is often not possible in the fishing industry.

Reduce compressive force by keeping the load close to the body.



DO NOT LIFT LIKE THIS!
When lifting/lowering a given load, the torso weight can contribute a lot of stress. Try to keep the torso as upright as reasonable and comfortable.

When pushing or pulling, remember that low-back compressive force is minimized when the force direction is close to the waist.

Shoulder stress can be reduced by task design and/or work practices which orient the force direction through the shoulder.

In general, pushing is lower stress than pulling. In fishing, however, you often don't have the option.

Locate the hands about half way between the low back and the shoulder when pulling or pushing so that neither the back nor shoulder is highly stressed.

Recommendations for reducing stresses on the back and spine:

- Keep the body upright (as much as possible).
- Keep the load/force close to body.
- Push/pull at mid-torso height.
- Don't twist the body.
- Don't jerk the load you are lifting.
- Get help when moving.
- Tighten stomach, exhale when lifting.
- Make a "bridge."

When possible, support yourself with your free hand when lifting or lowering to form a "bridge." This reduces stress on your back.

SHOULDER, ELBOW, WRIST & HAND

Forces on the upper extremities of the shoulder, elbow, wrist and hand, can cause ergonomic injury just as in the back and spine.

Shoulder: Common shoulder problems are tendonitis (inflamed tendon) and bursitis (inflamed bursa - which is a fluid filled sac in the shoulder).

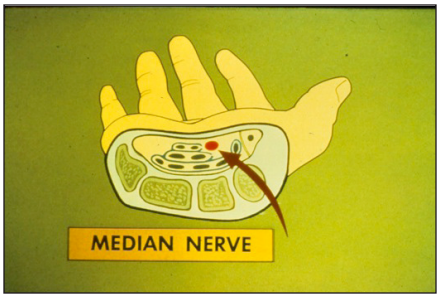
You can reduce your risk for ergonomic injury of the shoulder by taking a few precautions when possible:

- Avoid work at or above the shoulders.
- Get help when you have to do overhead work.
- Keep shoulders square and rolled back.
- Exercise shoulders and mid-back to maintain strength.

Elbow: Common elbow problems are generally related to tendonitis (or epicondylitis). You may have heard the term "Tennis Elbow," which is presented with pain or discomfort on the outside of the elbow, or "Golfer's Elbow," which is presented with pain or discomfort on the inside of the elbow. In commercial fishing this pain can develop (or increase) at the outside of the elbow due to tasks like lifting, gaffing, baiting and cleaning.

You can sometimes alleviate pain due to epicondylitis by:

- Avoiding the activity that causes the pain.
- Use an ice pack 30 minutes, 2x/day on the affected elbow.
- Use of anti-inflammatory drugs (consult your physician).
- Using a forearm brace.
- Using gloves that grip.
- Physical therapy.

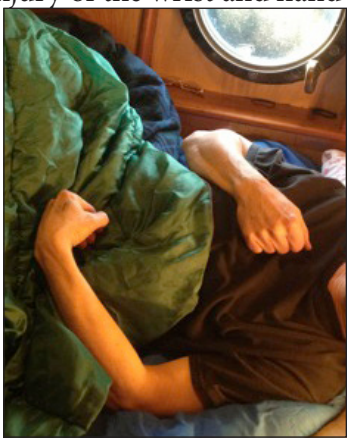


Wrist/Hand: Disorders of the hand and wrist are very common among commercial fishermen. Some common problems are tendonitis (including Carpal Tunnel Syndrome) and Vibration White Finger.

Many fishermen are quite aware of the symptoms of Carpal Tunnel Syndrome. Some of those symptoms are:

- Pain, tingling, cramping.
- Numbness in thumb, pointer, middle, inside of ring finger.
- Weak grip, clumsiness.
- Burning pain (worse at night).
- Tendency to find affected hand with bent wrist when at rest.

You can reduce your risk to ergonomic injury of the wrist and hand with these recommendations:



- Tool and task design to decrease hand force.
- Improve friction and grip characteristics.
- Optimize tool grip diameter (approximately 2 inches).
- Use power/full hand grip instead of pinch grip.
- Minimize wrist/shoulder deviation (bend the tool not the wrist).
- Reduce exertion time/increase muscle recovery time.
- Reduce repetition through job enlargement.
- Alternate hands.
- Use personal protective equipment (PPE).
- Reduce contact stress from hard surfaces with padding.

Risk Factors for Ergonomic Injuries

ABOUT ERGONOMIC INJURIES

Ergonomic injuries, also often referred to as musculoskeletal disorders (MSDs), are very common among commercial fishermen. An easy way to the think of the musculoskeletal system, is to think of it like a winch. Muscles are the motor which generate force, tendons are the cables which transfer that force, and the skeletal frame is like the metal frame of a winch. Damage in any of these areas in a winch creates a compromised system prone to weakness or failure; our musculoskeletal systems react much the same way when we have injury in any of these areas.

RISK FACTORS FOR MSDs OF THE UPPER EXTREMITIES

Just as in low back stress, stress to the upper extremities (shoulder, elbow, wrist and hand) is caused by force and posture and effort repetition/effort duration. More specifically affecting these extremities are grip force, posture, frequency/repetition, contact and cold temperature.

It helps to remember the "BIG 4" Risk Factors:

1. High force
2. Awkward Posture
3. Exertion Repetition & Duration
4. Shift Duration

Other Risk Factors are the Environment (meaning hot or cold temperatures) and of course, our own personal characteristics (age, body mass index, smoking, diet, fatigue, etc.).

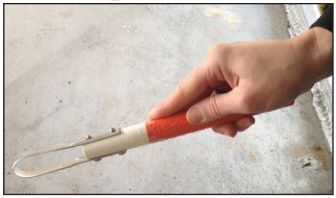
GRIP FORCE RISK FACTORS

Reduce risk factors caused by grip force by:

- Using tools designed to decrease hand force.
- Using a power grip rather than a pinch grip.
- Improving mechanical advantage.
- Automation.

Power Grip

Pinch Grip



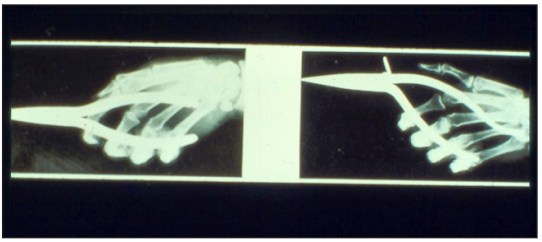
Left: This screwdriver reduces hand force because it has a handle that is easier to grip and turn. Center: Use a power grip as in the top photo rather than a pinch grip in the bottom photo. Right: This hammer improves grip with a high friction handle.

POSTURE RELATED RISK FACTORS

It is important to remember that high forces and/or awkward posture can cause tendonitis (inflammation of the tendons).
You can reduce posture related risks by:

- Workplace design/work orientation
- Minimizing wrist/shoulder deviation
- Keeping the hand in front, below mid-torso
- Altering work methods
- Automation

Awkward posture and wrist bend can be minimized by using tools with bends as seen in the x-ray image to the right.



Another example of putting the bend in the tool rather than the hand. Fish scrapers can have either a bend in the handle or the scraper to minimize posture related risk. Additionally, scrapers can also have hose fittings on the end to make work even more efficient.

FREQUENCY/REPETITION RISK FACTORS

Also remember that frequency/repetition increase risk to ergonomic injury as the stress on the body appears to accumulate with repeated exertions. You can reduce high frequency/repetition risk factors by:

- Increasing cycle time
- Worker rotation
- Alternating hands
- Taking more rest breaks
- Greater job variety
- Automation

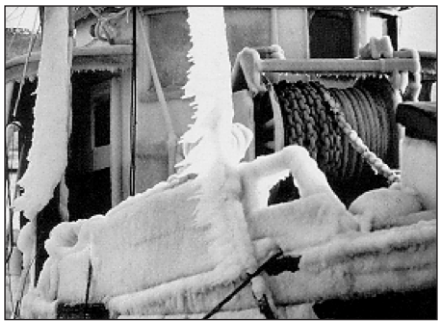
Spending long hours at one station doing the same task is a greater risk for ergonomic injury than switching tasks throughout the day.

CONTACT TRAUMA RISK FACTORS

Contact risk factors may cause ergonomic injury due to direct contact with the work piece, tool or work surface. This is especially hazardous when the hand is used repeatedly to pound or push on parts. Contact trauma is also possible when the elbows are rested on a hard work surface or when the forearms come in contact with the with the sharp edges of a work surface. You can reduce contact trauma related risks by:

- Using padding
- Distributing force among fingers
- Alternating hands
- Workplace redesign
- Automation

COLD TEMPERATURE COMPOUNDS RISKS



Cold temperatures may present a direct hazard to the tissues, or desensitize the receptors in the hands, and cause the worker to grip the tool harder than necessary. This may increase the grip force risk noted earlier. Additionally, cold temperatures combined with vibration may lead to Vibration White Finger - a repetitive stress injury that causes the fingers to turn white due to spasms in the small blood vessels. When the vessels spasm they constrict and cut off blood flow to the fingers causing them to turn white.

A photo of Vibration White Finger - an example of the compounded risk of cold plus vibration.

Prevention

You can reduce your risk for, or even prevent, ergonomic injury - even as a commercial fisherman. The key is to be aware of what you can do to minimize your risk (when possible) and how to alleviate symptoms when they do occur. Remember some key points covered in this guide to make your work easier on your body:

- Distributing force among fingers.
- Move your feet, don't twist your body while using force.
- Try to limit effort repetition and task duration.
- Use two people to lift heavy objects when possible.
- Keep your body upright as much as possible during exertion.
- Keep the load/force close to your body.
- Push or pull at mid torso height.
- Tighten stomach and exhale when lifting.
- Remember to make a "bridge" when possible.
- Be mindful of extreme temperatures (hot or cold).
- Develop methods to limit movement of fish and gear.

Commercial fishing is hard work, but you can learn ways to reduce the physical toll it takes on your body.

Stretches & Exercises

Exercises can help avoid problems altogether. Why are exercises a good idea? Well, a number of reasons - including, increased blood and oxygen, increased flexibility and agility, it makes us more mentally alert and all of these things contribute to being more productive. You can exercise anytime - before work, during work or after work. Certain exercises will be easier to do during non-fishing times, but others can be done during breaks from work. Think about developing a 2-5 minute "warm-up" routine before you go out to work on deck.

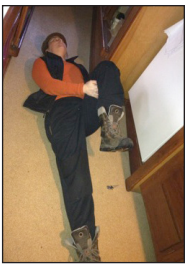
Take these into consideration when thinking about exercises:

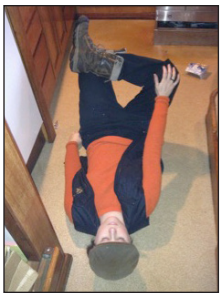
1. The idea is to increase flexibility.
2. Stretch slowly but do not bounce or cause pain/worsen condition.
3. Should be part of a daily routine.
4. Have underlying conditions professionally assessed.
5. If serious musculoskeletal issues exist, get professional help.
6. Develop a habit of exercises every day.

BACK EXERCISES

Knee to Chest Stretch

1. Hand behind knee, pull knee to chest until comfortable stretch felt in lower back/buttock.
2. Relax back.
3. Hold 30 seconds - Repeat 3x, alternate legs.



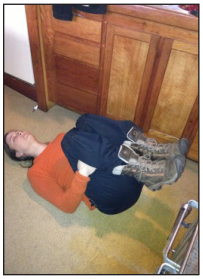


Back Adductor Stretch

1. Place foot outside opposite knee.
2. With hand push away on bent knee.
3. Hold 30 seconds.
4. Alternate legs - Repeat 3x.

Lower Trunk Rotation

1. Keep back flat and feet together.
2. Rotate knees to left/right side.
3. Hold 30 seconds
4. Repeat 3x per side.

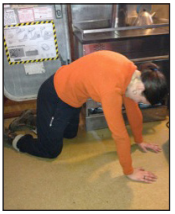


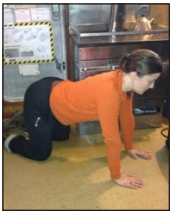
Knees to Chest

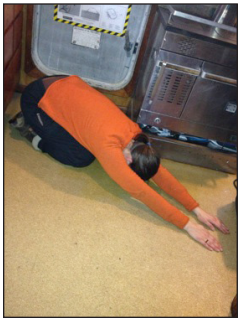
1. Lie on back with knees bent.
2. Bring knees to chest using arms.
3. Do 2 sets, 30 seconds each.

Cat/Cow Stretch

1. Arch back 30"- sag back 30"
2. Do 2 sets of 3 reps





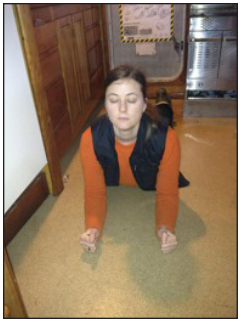
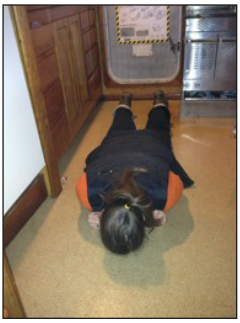


Trunk Stretch

1. Reach arms out, elbows straight.
2. Gently sit back on heels.
3. Hold 30 seconds.
4. Do 2 sets of 3 reps.

Nerve Glides

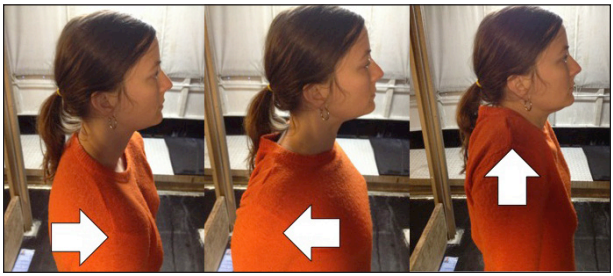
1. Press palms together.
2. Keep forearms parallel to ground.
3. Move hands side to side as far as feels comfortable.
4. 20 reps, no holding.

Cobra Stretch
1. Rise up on elbows (only as high as comfortable).
2. Keep hips on floor.
3. Hold 10 seconds.
4. Repeat 10x.

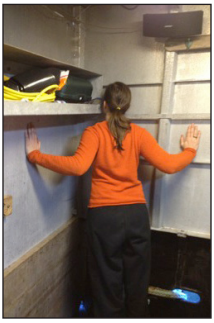
SHOULDER EXERCISES

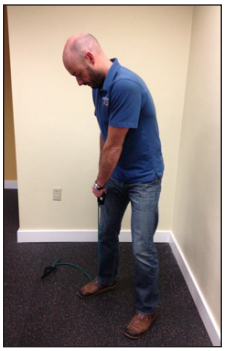
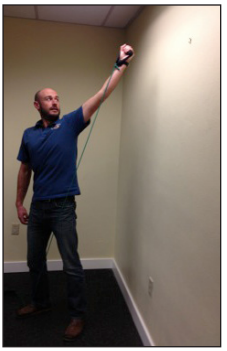
Scapular Retraction
1. Elbows bend to 90°.
2. Pinch shoulder blades together.
3. Rotate arms out.
4. Keep elbows bent.
5. Do 10-30/set.
6. Repeat every few hours.



Shoulder Shrug
1. Shrug shoulders up & back.
2. Do 20-30x/day.
3. Repeat every few hours.

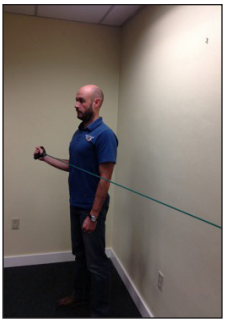
Corner Stretch
1. Stand in corner, hands about shoulder level.
2. Lean forward until comfortable stretch felt across chest.
3. Hold 30 seconds.
4. Repeat 3x and do 1 – 3x/day.



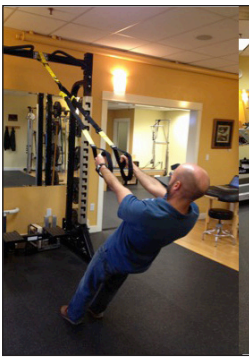
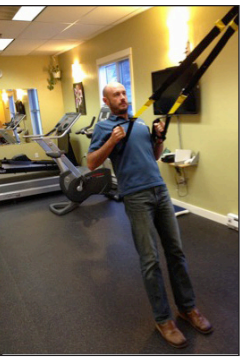
Resisted Diagonal
(Bungees like this one can be bought at a pharmacy or physical therapist and used at home or boat.) Place one end under foot and lift across body extending arm up as pictured at left. Perform to pain-free fatigue, 3 sets.

Resisted Rotation
Attach one end to door or bulkhead and pull across body by rotating out at shoulder, maintaining 90 degree bend arm. Perform to pain-free fatigue, 3 sets.

Dips
(A suitable surface for hands can be found at home or vessel.) Lift and lower weight of body as shown at left. Perform to pain-free fatigue, 3 sets.

Shoulder Rows w/ Rope
(You can make this yourself with rope and hang it from an overhead on your vessel.) With Feet in place, bend elbows to raise body. Perform to pain-free fatigue, 3 sets.

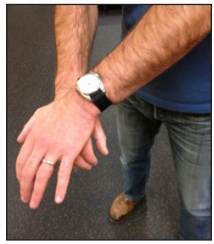
Push-Ups
While on hands & toes, lower and raise body by bending at elbows. Keep knees/hips off floor. (If you have lower back problems, keep knees on floor.)

Wall Clock Stretch
1. Hands outstretched, palms up- hold 30 seconds.
2. Raise arms 45°. Hold 30 seconds.
3. Raise arms upright, thumbs facing back.

ELBOW, HAND & WRIST EXERCISES

Elbow-Hand Bend
1. Move hand against fixed resistance.
2. Hold 3 seconds, repeat10x.

Elbow -Hand Press
1. Move wrist back against fixed resistance.
2. Hold 3 seconds, repeat 10x.



Active Hook Fist (for Carpal Tunnel Syndrome)
1. With fingers & knuckles straight, bend middle & tip joints (do not bend large knuckles.)
3. Repeat 10x and do 1 or 2x/day.

Active Full Fist
1. Straighten all fingers.
2. Make a fist.
3. Bend all joints.
4. Repeat 10x; 1-2x/day.

Active Straight Fist
1. Fingers straight.
2. Bend knuckles & middle joint.
3. Touch fingertips to palm.
4. Repeat 10x, 1-2x/day.

Wrist Extensor Stretch
1. Keep elbow straight.
2. Grasp hand & slowly bend wrist forward until stretch is felt.
3. Hold 30 seconds.
4. Relax.
5. Repeat 3x/day or every few hours.

Wrist Flexor Stretch
1. Keep elbow straight, grasp hand
2. Slowly bend wrist back till stretch is felt.
3. Hold 30 seconds.
4. Relax
5. 3x/day or every few hours.

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