COASTAL KAYAK
INSTRUCTOR's MANUAL

Compiled by Sean Morley | 2020

INTRODUCTION

This manual is primarily intended as a reference for coastal kayak instructors and aspiring instructors whether teaching professionally for a commercial business or academic institution or as a volunteer with a club or informal group. It is also likely to be very useful reading for all paddlesport instructors, and recreational paddlers seeking to develop their knowledge and skills since many of the concepts and tools discussed can be used to self-teach.

The goal of the manual is to introduce and explain fundamental principles, educational concepts, methods and tools that have been proven to be effective in teaching coastal kayaking. The goal is not to produce a 'How To' guide for learning to paddle. Some basic knowledge is assumed and may not be discussed or covered in any detail.

It is often said that there are as many opinions as there are instructors and whilst it is impossible to keep opinion entirely out of this text, I have strived to only include opinions that are widely held and supported by facts and science. Subjectivity is a fact of life within teaching and assessment, but the aim of this manual is to encourage a more objective approach, using assessment methods and tools to improve the quality of the process.

The contents of this manual are relevant for instructors teaching using any paddlesports organization's curricula; American Canoe Association (ACA), Paddle Canada or British Canoeing (formerly known as the BCU). Indeed, many instructors and coaches have trained with and are certified to teach through more than one paddlesports organization and this manual represents the shared knowledge of the coastal kayak community at large, not just one single organization. That said, this manual should be read in conjunction with the **ACA's Instructor's Manual** and the **BCU's Coaching Handbook.**

The principle of 'Learning by Doing' is the cornerstone of paddlesports instruction and whilst it is easy to get absorbed by the more technical aspects of coastal kayaking it should not be forgotten that teaching and learning to paddle should be fun too!

This manual is not presented as an original work but more a compilation of publicly available information relevant to the coastal kayak instructor, as well as content that has been generously contributed by fellow coastal kayak instructors, coaches and educators. Much has been plagiarized or copied and I am grateful to all those that have contributed, either knowingly or unknowingly! This will remain a "live' document and will be regularly updated. Contributions are always welcome!

This manual in its present form will not be sold commercially but shared free of charge.

Chapters 1 through 4 are largely theory. Chapters 5 through 7 provide some practical tools and advice.

CONTENTS

1. LEARNING THEORY

What I hear, I forget.

What I see, I remember.

What I do, I understand.

Old Chinese proverb, sometimes attributed to Confucius

The goal here is to present some widely held concepts and to encourage you to test them out and discover what works best for you and your teaching style in the context that you will be using them.

It is important to remember that most people learning to kayak are doing so for adventure, to be active and recreate. Not everyone is seeking to perform at a high level or become what might be considered by us to be an advanced paddler. Our role is to help them become the best paddler they want to be and to keep them safe and having fun during that process.

The evolution of learning theory is far from over and there are many opinions on how we learn and the best methods for teaching the practical skills and related theory associated with coastal kayaking.

1.1 Motor & Cognitive Skills

Motor skills refer to the ability to perform complex muscle-and-nerve acts that produce movement; fine motor skills are small movements like writing and tying shoes, gross motor skills are large movements like walking and kicking.

Cognitive skills refer to mental processes using the brain that are born out of knowledge and experience. They include problem solving, judgment, decision making, evaluation and reasoning.

Learning to paddle a sea kayak requires the acquisition of a vast array of fine and gross motor skills and the simultaneous development of cognitive skills. Our teaching should reflect this with

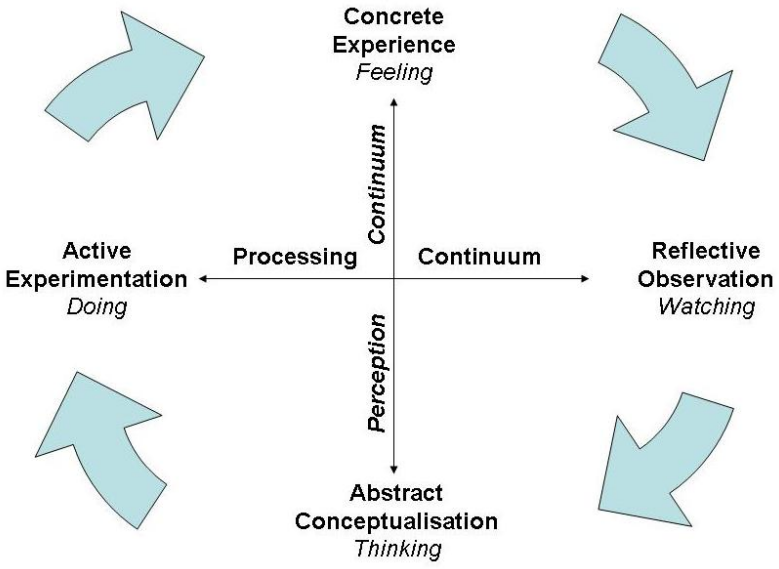
sufficient time spent on developing a ‘feel’ for the water and for how the body, boat and paddle move (fine motor skills), and not just a focus on whole strokes (gross motor skills).

The context for each skill is critical for developing cognition and understanding. The more experienced you become as a paddler, the easier it is to mistakenly assume knowledge in your students. They don’t know what they don’t know – it is your job to help them at least understand what they need to know and motivate them to learn more.

1.2 Learning Styles & Preferences

It has long been suggested that we all have different ways that we learn, based on our genetics, personality type, life experiences, and the demands of our current environment. There is increasing skepticism about the validity of these concepts, but at the very least they encourage us to think about how we learn and how we could adapt our teaching style to benefit different types of learners.

Psychologist David Kolb published his learning styles model in 1984 from which he developed his learning style inventory.



Kolb's experiential learning theory works on two levels: a four-stage cycle of learning and four separate learning styles. Much of Kolb's theory is concerned with the learner's internal cognitive processes. Kolb’s learning theory suggests that when learning a new skill, we first experience the activity. We then reflect on the experience and develop an intellectual model

about how to do the activity. Finally, we use the model to experiment with new techniques, leading to new experiences. The process then is repeated, creating an upward spiral of knowledge and ability. Although everyone has a preferred learning style, everyone also must move through each of these stages to fully understand and execute any new skill.

KOLB'S LEARNING STYLE INVENTORY

The Thinker
Learns by: Analytical, intellectual approach; reads, wants information, technical explanation; mental process is primary.

To recognize: Asks questions, repeats information, wants discussion; hesitates to do it.

Needs: Clear explanations and mental images; but mainly needs encouragement to act and feel; get beyond the mental image.

The Watcher
Learns by: Watching others, observation, mental images.

To recognize: Holds back, waits for others to go first, asks to see it again.

Needs: Good model to imitate; must be encouraged to try the skill and experiment.

The Doer
Learns by: Doing it; hands-on approach.

To recognize: Jumps right in; is fidgety and gets bored with explanations; non-attentive, doesn't watch before trying the activity.

Needs: Active participation, very brief explanation; to be encouraged to pay attention, and tune into kinesthetic (feeling) sense; good feedback.

The Feeler
Learns by: Feel, has good kinesthetic sense; experiments to get a feeling for the activity.

To recognize: Wants to try it, but more tentative than the doer; gets bored with explanations; tries different approaches; good physical awareness.

Needs: Active participation, good model; may need encouragement to keep trying.

Whilst the principle that we should adapt our teaching to everyone's 'Learning Style' has been a mainstay of education for decades, **there is considerable debate on the validity of the learning styles theory.**

There is little research that supports the notion that learners are more successful when exposed to a teaching method that matches their personally perceived learning style.

LEARNING PREFERENCES

What do we mean by **"Learning Preferences"** and how do they differ from **"Learning Styles"**? We use the phrase "learning preferences" to refer to a person's characteristic patterns of strengths, weaknesses and preferences for taking in, processing, and retrieving information, acquiring skills and developing understanding.

Verbal/Written

Learners who prefer this learning style are most comfortable learning by reading. Often, in order to remember new information, they must see it written down before they can transfer it to long term memory. They might also be most comfortable expressing the information they know through writing about it.

Aural/Auditory/Oral

For these learners, information is most easily processed through hearing it. A strongly auditory learner might read aloud when they reach a particularly difficult part of a written text and will usually enjoy studying with another person or in a group. Sometimes auditory learners are also most confident and capable when they express their thoughts orally, rather than in writing.

Visual/Graphic

These learners learn best when using pictures, graphs, concept maps, grids, matrices and other visual representations of the information to be learned. These students may need to convert notes from class or readings to concept maps, or they might find it easier to organize a paper if they use a map rather than a traditional linear outline.

Kinesthetic/Tactile Concrete

Kinesthetic learners learn through their whole body: sight, smell, movement, touch, and color all help kinesthetic learners. They will learn best by 'doing:' manipulation of equipment, hands-on training, application of information to real world situations, creating and manipulating models, color-coding, simulations - the key is moving, touching, doing! Many students combine a preference for kinesthetic learning with another channel but have never explored using kinesthetic study strategies.

Active/Reflective

Active learners prefer to learn in the moment, processing information 'on the go'. They often benefit from discussion and studying with others.
Reflective learners prefer to process information internally. They generally take in information and spend time thinking it through before feeling comfortable joining a discussion or group. Reflective learners are often quiet in class discussions and might benefit from learning ways to participate more actively in class.

VAK Model

Walter Burke Barbe and colleagues proposed three learning modalities (often identified by the acronym VAK):

- Visualizing modality
- Auditory modality
- Kinesthetic modality

Descriptions of learning modalities		
Visual	**Kinesthetic**	**Auditory**
Picture	Gestures	Listening
Shape	Body movements	Rhythms
Sculpture	Object manipulation	Tone
Paintings	Positioning	Chants

Barbe and colleagues reported that learning modality strengths can occur independently or in combination (although the most frequent modality strengths, per their research, are visual or mixed), they can change over time, and they become integrated with age.

They also pointed out that learning modality strengths are different from preferences; a person's self-reported modality preference may not correspond to their empirically measured modality strength.

In the 90's New Zealand school inspector, Neil Fleming, included an ''R'' for people who prefer to read information in order to retain it, creating the **VARK** model.

Tips for working with VAK Learning styles

Visual Learners:

- use visual materials such as pictures, charts, maps, graphs, etc.
- have a clear view of your teachers when they are speaking so you can see their body language and facial expression
- use color to highlight important points in text
- take notes or ask your teacher to provide handouts

- illustrate your ideas as a picture or brainstorming bubble before writing them down
- write a story and illustrate it
- use multi-media (e.g. computers, videos, and filmstrips)
- study in a quiet place away from verbal disturbances
- read illustrated books
- visualize information as a picture to aid memorization.

Auditory Learners:

- participate in class discussions/debates
- make speeches and presentations
- use a tape recorder during lectures instead of taking notes
- read text out aloud
- create musical jingles to aid memorization
- create mnemonics to aid memorization
- discuss your ideas verbally
- dictate to someone while they write down your thoughts
- use verbal analogies, and storytelling to demonstrate your point

Tactile/Kinesthetic Learners:

- take frequent study breaks
- move around to learn new things (e.g. read while on an exercise bike, mold a piece of clay to learn a new concept)
- work at a standing position
- chew gum while studying
- use bright colors to highlight reading material
- dress up your workspace with posters
- if you wish, listen to music while you study
- skim through reading material to get a rough idea what it is about before settling down to read it in detail.

TYPES OF LEARNER- HONEY AND MUNFORT

Peter Honey and Alan Mumford (1986) identify four distinct types of learner:

1. **ACTIVISTS**

- 'They'll try anything once'.
- Dash in where angels fear to tread. Throw caution to the wind.
- Are excited by new experiences but get bored very quickly!
- They tend to throw caution to the wind.
- Tend to be open minded, enthusiastic - not skeptical

- Revel in short term crisis firefighting, brainstorming problems
- They are gregarious people, constantly on the go with others.
- They tend to 'perform' and hog the limelight.

2. REFLECTORS

- They watch, think and wait before trying new 'experiences'.
- Show considerable caution and 'look before they leap'.
- Adopt a low profile, are tolerant, unruffled and slightly distant.
- Prefer to take a back seat in meetings and discussions.
- Enjoy observing other people in action.
- Listen to others, and consider salient points before contributing
- Take a holistic view of past and present
- Put off committing to themselves and others.

3. THEORISTS

- Analyze observations into logical complex models.
- Think problems through logically 'step by step'.
- Like to analyze and synthesize. Don't do touchy feelie!
- Assimilate disparate facts into coherent theories.
- Are keen on basic principles, theories, and systems thinking.
- Tend to be detached, analytical and dedicated to objectivity
- Dislike anything flippant, subjective or ambiguous.
- Ask: "Does it make sense? How does it fit in?"

4. PRAGMATISTS

- Think "if it works, it's good!"
- Put theories and models through practical tests.
- Positively search out new ideas and experiment with strokes.
- Act quickly and confidently on ideas that attract them.
- Respond to problems and opportunities `as a challenge'.
- Are practical, 'can- do' people who like practical solutions.
- 'Can't be doing' with theories and 'long- winded' discussions.
- If all else fails, they'll read the instructions.

NASSP Model

In the 1980s, the National Association of Secondary School Principals (NASSP) formed a task force to study learning styles. The task force defined three broad categories of style—**cognitive**, **affective**, and **physiological** (and 31 variables, including the perceptual strengths and preferences from the VAK model of Barbe and colleagues), but also many other variables such as need for structure, types of motivation, time of day preferences, and so on.

They defined a learning style as:

"a gestalt - not an amalgam of related characteristics but greater than any of its parts. It is a composite of internal and external operations based in neurobiology, personality, and human development and reflected in learner behavior."

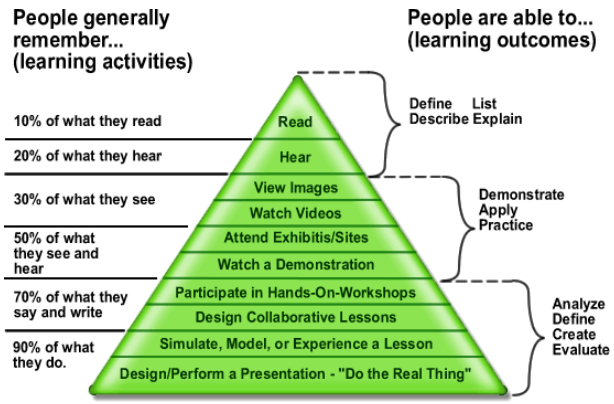
- **Cognitive** styles are preferred ways of perception, organization and retention.
- **Affective** styles represent the motivational dimensions of the learning personality; each learner has a personal motivational approach.
- **Physiological** styles are bodily states or predispositions, including sex-related differences, health and nutrition, and reaction to physical surroundings, such as preferences for levels of light, sound, and temperature.

Per the NASSP task force, styles are hypothetical constructs that help to explain the learning (and teaching) process. They posited that one can recognize the learning style of an individual student by observing his or her behavior. Learning has taken place only when one observes a relatively stable change in learner behavior resulting from what has been experienced.

Cone of Learning

Edgar Dale was an American educationist who developed the "Cone of Experience" which he intended to provide an intuitive model of the concreteness of various kinds of audio-visual media but has been widely misrepresented.

Often referred to as the "Cone of Learning," it purports to inform viewers of how much people remember based on how they encounter information. However, Dale included no numbers and did not base his cone on scientific research, and he also warned readers not to take the cone too seriously.



What is clear is that we can learn by reading, listening and having experiences. The best way for most people is often a combination, but with a strong active component, as the tables below show.

Learning Recall Related to Type of Presentation

Presentation Style	Ability to Recall	
	after 3 hours	after 3 days
Spoken lecture	10-20%	25%
Written (reading)	72%	10%
Visual and verbal (illustrated lecture)	80%	65%
Participatory (role plays, case studies, practice)	90%	70%

Adapted from: Dale 1969.

Active learning engages the whole person, not just the intellectual mind. When people try to do things and fail or succeed, emotions are triggered, and these have a significant effect on how we remember. So, when you are teaching or persuading someone, and particularly if you want them to remember things, get them actively involved.

When you are developing training, ensure there are plenty of practical activities alongside just enough theory for them to integrate the learning with their existing schema or understanding.

Transfer of Learning

Training Components	Skills Attained	
Theory	+	10-20%
Demonstration	+	30-35%
Practice	+	60-70%
Feedback	+	70-80%
Coaching	+	80-90%

Adapted from: Joyce and Showers 1981.

For more on Feedback – See Section 2. Teaching Theory

What should we conclude from all these models and theories?

The take-away must be that we challenge ourselves as teachers, instructors and coaches to find alternative ways to facilitate learning. A lecture format has its place, particularly if a large volume of information needs to be imparted in a limited time. But you should ask yourself if there is a better way to deliver that information and be mindful that only a limited amount of that information will be retained unless the lecture is supported by other teaching methods.

It is highly likely that certain topics are more suited to specific teaching methods irrespective of the learning style of the student.

There may be time constraints or other reasons why one method of instruction is chosen over another.

A good instructor should develop a teaching style that addresses all the learning style traits for the following reasons:

- Most people have a combination of the traits described.
- It may be difficult to recognize the dominant trait for any individual.
- A group of students will all have different personality characteristics.
- All the described traits have positive and negative aspects.
- People learn best by engaging all their senses.

By switching up the way we present information, teach skills or enable students to discover for themselves through experimentation, we will avoid boredom for ourselves and our students.

1.3 The Four Stages of Learning

Learning can be a frustratingly slow process. As educators it is our job is not just to teach the individual but to guide, encourage and mentor. We need to understand the process and facilitate learning by timely introduction of skills and knowledge and intervention when the learning process is disrupted. We need to understand, and we need our students to understand and accept that not doing it right and making mistakes are vital steps in the learning process.

Yet too often our attention goes to trying to achieve success within some arbitrary timeframe, rather than to the learning at hand.

Understanding the four stages of learning a skill can help keep the learning process focused on the individual, and not on the curriculum that needs to be covered. The theory was developed at Gordon Training International by its employee Noel Burch in the 1970s. It has since been

frequently attributed to Abraham Maslow, although the model does not appear in his major works.

Unconscious incompetence

This is the stage of blissful ignorance before learning begins. The individual does not understand or know how to do something and does not necessarily recognize the deficit. They may deny the usefulness of the skill. The individual must recognize their own incompetence, and the value of the new skill, before moving on to the next stage. The length of time an individual spends in this stage depends on the strength of the stimulus to learn.

Conscious incompetence

This is the most difficult stage, where learning begins, and where the most judgments against self are formed. This is also the stage that most people give up. Though the individual does not understand or know how to do something, he or she does recognize the deficit, as well as the value of a new skill in addressing the deficit. The making of mistakes can be integral to the learning process at this stage.

Conscious competence

This stage of learning is much easier than the second stage, but it is still a bit uncomfortable and self-conscious. The individual understands or knows how to do something. However, demonstrating the skill or knowledge requires concentration. It may be broken down into steps, and there is heavy conscious involvement in executing the new skill.

Unconscious competence

The final stage of learning a skill is when it has become a natural part of us; we don't have to think about it. The individual has had so much practice with a skill that it has become "second nature" and can be performed easily. As a result, the skill can be performed while executing another task. The individual may be able to teach it to others, depending upon how and when it was learned.

When trying to understand how far in the learning process a student has progressed, the following **observation-based categorization** might be useful:

Cognitive (Novice)

- Major errors can occur
- Jerky and fitful style
- Needs demonstration and praise

Associative (Improver)

- Some errors still evident
- Builds patterns and joins up learned skills
- Needs different environments to develop skill adaption

AUTONOMOUS (EXPERT)

- Few small errors can be seen
- Builds and refines established skills
- Fluid style
- Can transfer most learning to novel situations

1.4 Teaching the Brain (Cross Patterning)

Put simply, the brain is split into two halves. Each side of the brain is different and learns differently. We all use one side of the brain more than the other, but we are using both sides of the brain all the time.

LEFT BRAIN

- Hemisphere for logical thinking
- Languages, writing, reading and math
- Processes information in a linear fashion
- Separates out the parts that make up the whole and focuses on detail

RIGHT BRAIN

- Hemisphere for creative thinking
- Non-verbal activities, listening to music, drawing, daydreaming

Cross Patterning:

Cross patterning describes physical movement that involves crossing the midline of the body, using the upper and lower body, or right and left side separately.
The theory being that if each brain hemisphere controls the opposite side of the body, by intentionally moving an opposite arm and leg across the midfield, we fire off both brain hemispheres at the same time, creating better neural connections.

Paraphrasing from Suzana Zuzan, Prague Institute of Rehabilitation: Developmental movement patterns are wired in our DNA, and when we correctly activate those patterns, the body immediately relaxes, and movement becomes more fluid.

A fundamental energy therapy technique, homo-lateral patterning exercises are a series of movements that encourage your body's energies to cross over from one side of the body to the other. Walking, or marching in time with your arms swinging freely beside you, are examples of movements that enable your body to maintain its natural balance. Benefits include decreased pain, improved sports performance, improved range of motion, balance, posture, mental focus and emotional stability.

Traditional movement patterns (squat/lat pull/pull ups/bench press, etc.) are all good exercises, however the familiarity of these movement patterns also encourages the exerciser to go through the movement in “auto mode.” Cross patterning movements require more body awareness and focus, and they enhance the coach/client interaction.

Cross patterning is based on the concepts of proprioceptive neuromuscular facilitation, or simply PNF. Many may believe PNF is just about contract-relax strategies, but it is far more complex.
From a therapeutic standpoint PNF is designed to:

- Increase the patient’s ability move or remain stable.
- Guide the motion by proper grips and appropriate resistance.
- Help the patient achieve coordinated motion though timing.
- Increase the patient’s stamina and avoid fatigue.

Understanding that the body works naturally in spiral and diagonal patterns helps us promote true functional movement. In general, PNF exercises combine movements in all three planes - sagittal, frontal, and transverse.

How can we introduce Cross Patterning into paddlesports coaching?

- Land based warm up routines that involve crossing the center line of the body.
- Have students work on both sides. Many students will say they have a ‘weak’ side. By allowing students to defer to their strong side, they are missing the opportunity to develop their brain.
- Drills that cross the center line of the kayak: Crossbow rudders, cross bow sculling, cross bow pry, tapping drill (forward stroke), paddling on just one side, with the opposite side blade.
- Have students spin around while in their seat or while sat on their rear deck.
- Once an exercise or feature can be successfully completed going forwards, have them do it in reverse.

2. TEACHING & COACHING THEORY

There is not one single way to teach anything, least of all sea kayaking. As instructors, we all bring our own 'baggage', our experiences, our own strengths, preferences, and opinions. And that is a good thing! There is no 'one-size-fits-all' and having a variety of instructors to choose from is essential for a program to be successful.

The goal of this section is to outline some common concepts that should be considered by all instructors.

Which brings up a question: "*What is the difference between a teacher, an instructor and a coach?"*

The ACA uses the term "**Instructor**", the British Canoeing uses the term "**Coach**". Is it just semantics?

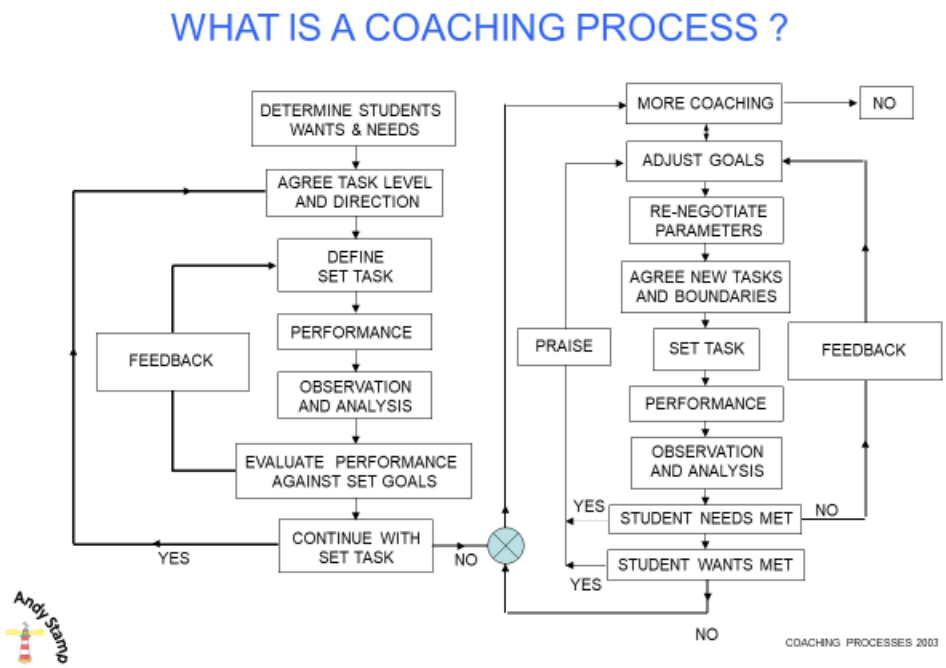
The term 'Instructor' suggests a top down approach, where the instructor is teaching a curriculum to a group and the individual student's needs are not necessarily given top priority. It suggests there is a structure to the lesson with defined parameters of time and content objectives that allows the process to be efficient but may not achieve the desired outcome for everyone within the group. The 'Instructor' approach might work well in a commercial context where quantity may have priority over quality.

The term 'Coach' suggests a more personalized approach where the student is put first. It will demand flexibility and adaptability both from the coach and the students. It could potentially be more challenging in the group context where the needs of the individuals within the group might compete or contradict making session planning a seemingly impossible task especially if working alone. The term 'Coach' also suggests a longer-term relationship, less of a production line and an expectation that it might take longer to achieve outcomes, but those outcomes may be of a higher quality. The 'Coach' approach works best in the context of a club or educational establishment where there is less pressure to produce revenue.

Why each paddlesports organization chooses to use these terms is perhaps a politically charged question. It reflects the historical roots of paddlesports in each country and how a strong club structure developed in the U.K., whereas in the U.S.A. the commercial outfitter was the main driver of paddlesports.

Whether you consider yourself an 'Instructor' or a 'Coach' or perhaps both, can we agree that we are all educators?

To be an effective 'Instructor' or 'Coach', you need to have a **process** to follow.



As you become more experienced you will develop your own processes and the following sections are intended to help steer you along that path.

CHARACTERISTICS OF A GOOD KAYAK INSTRUCTOR

- Organized
- Good Leadership Qualities
    - Maintains control of group
    - Keeps track of group
    - Aware of all participants always
    - Projects self-confidence (not flustered, uncertain, or erratic)
- Thorough Knowledge of Kayaking
- Excellent Kayaking Skills
    - Ability to model and teach kayaking technique and skills
    - Aware of changing conditions on the water
- Good “People Skills”
    - Good Communicator
    - Speaks clearly, with adequate volume
    - Concise and to the point
    - Observant

    - Can see when students need special attention
    - Tuned into learning styles
    - Can get along with a variety of personalities
    - Doesn't get pushed around
    - Tactful and diplomatic
    - Not egotistic
- Motivated, Enthusiastic
    - Never projects boredom
- Flexible (very important for sea kayaking)
    - Adjusts to the unexpected and to evolving situations
    - Spontaneous; "we'll make it work!" attitude.
- Ability to Work with Other Instructors (Teamwork)
- Open to New Learning Methods and Receptive to Feedback
- Patience
- Sense of Humor!

TWELVE RULES FOR MORE EFFECTIVE TEACHING

Modified from an article by Charles Moen in the ACA SEI Newsletter, vol. 1, no. 2, 1996

1. Take charge and clearly state that the class is starting: *"Ok let's get started."* Memorize a key phrase to get going.
2. Don't try to teach those who don't want you to teach them.
3. Establish the goals of your class ahead of time.
    - *Prioritize by teaching the most important things first.*
    - *Don't try to teach everything you know.*
4. Memorize these words and use them often:
   "Great!", "Wonderful!", "Keep going!", "You're getting it!"
    - *Be sincere.*
    - *Start with an activity where the success rate is high.*
    - *Follow up with specific feedback.*
5. Give clear, specific feedback.
    - Memorize the key components for the skill you are teaching
    - When giving feedback focus on one point at a time
6. Listen to your students.
    - *Be sensitive to individual needs.*
7. Don't go where you don't want your students to go.
   Exception: When scouting out a route to determine if it's safe; but make it crystal clear this is what you are doing.
8. Do what you want your students to do.
9. Be positive! Keep the energy high.

10. Be a student.
    - *Don't forget what it was like when you were a student, first learning to paddle.*
    - *Sign up for a class to recapture the experience of being a student*.
11. Teach people how to teach themselves.
12. Keep it moving.
    - *Lecture should be kept to a minimum.*
    - *Focus on doing, not talking.*
    - *Stop lecturing when you can no longer point to things to illustrate your words.*

2.1 How to Teach a Skill

Definitions

TASK
A given activity. A job to be done.

TECHNIQUE
The method used to perform a given task. A technique defines how something should be done.

SKILL
- The ability to select the appropriate technique at the right time in the right environment.
- The ability to bring about pre-determined results with maximum certainty, often with the minimum outlay of time or energy (or both). **Knapp 1963**

Technique > *Varied Adaptions* > *Varied Applications* > **Skill**

Teaching Models

There are two models that many kayak instructors are familiar with: the "Sell IT, Show It, Do It" model and the iDeAs model. Remember, the right way to teach anything is the way that works best for the student.

Sell It – Show It – Do It – Use It

I. **SELL IT:** Motivation, Purpose (approx. % time spent: 2%)

Create in your students a receptive attitude and desire to learn the skill:
A. Put the students at ease; keep things informal.

B. Name the skill.
C. Use stories to prove the importance of the skill.
D. Purpose of the skill: When, where, and why it is used.

II. SHOW IT: Present, demonstrate, model the skill (approx. % time spent: 3%)

Arrange your demonstration so that the students can see and follow what you are doing:

A. Teach one skill at a time.
B. Explain while showing.
C. Face the students during your show and tell; establish eye contact.
D. Speak concisely and demonstrate clearly.
E. Stress the key points of the skill.
F. Use repetition (show it more than once).
G. Use a "whole-part-whole" approach for more complex skills:

1. First demonstrate the skill (as a whole).
2. Break the skill into parts.
3. Show the skill (as a whole) again in slow motion.

III. DO IT: Work on and practice the skill (95% of time on "Do it" and "Use it")

Have the students practice individually, with partners, or as a group, depending on the type of skill and size of the class:

A. Have the students do the skill.
B. Have the students practice each part of a skill progressively, leading to attainment of the whole skill.
C. Reinforce good technique; watch for and correct errors immediately (correct one error at a time). Early correction of errors leads to success.
D. Encourage and compliment your students.

IV. USE IT: Application of the skill

The "Law of Use and Disuse" states that a skill which is used frequently becomes a habit; if not used it may be forgotten.

A. Apply and adapt the skill to various situations:
    1. Use drills, problem solving, obstacle courses, etc.
    2. Encourage use of the skill in actual situations.
    3. Review skills periodically.

4. Teach skills to others.

MODELING VS. DEMONSTRATION

The major difference between modeling and demonstration is the <u>speed</u> with which the technique or skill is performed.

Demonstration:
A demonstration is best performed at 'normal' speed. A demonstration may encompass the complete task or be broken into building blocks as part of a progression. The student records the relative movement in a demonstration as a mental sketch or 'visual blueprint'. With careful use of appropriate briefing and questioning the coach can check a student's perception of the demonstration.

Coaching via demonstration (only) is effective when the focus is on outcome, but students need sufficient motor skills and understanding to assimilate what they have seen.

Components of a good demonstration:

- Clear, correct and complete
- Accurately performed in real time
- Performed without commentary (prime verbally)
- Relevant to practice (environment/context)
- Properly structured with a start and finish

Modeling:
Modeling will typically be performed at slower than 'normal' speed. It will likely focus on a specific technique.

Components of effective modeling:

- A demonstration for those with a degree of skill and used to highlight specific points or markers.
- Effective enhancement of the form and quality of movement.
- Promotes long term retention of movement.
- The model shown will be copied and must be correct and accurate.

TYPES OF PERFORMANCE

PEER TO PEER – performed by the student's peer; good for motivating developing paddlers.
COACH PERFORMANCE – (hopefully) displays good technique, aspirational for students, helpful if the aim is to spotlight specific teaching points.
VIDEO REVIEW – Slow motion options are great for breaking down complex movements.

The i D e A*(F)*s Model

introduction: brief (30 seconds) motivation for what is about to be taught

Demonstration: a 'normal' speed presentation of the technique shown from multiple angles, preferably with minimal or no talking so students can focus on the visual elements.

explanation: Keep It Simple! – 1 to 3 key points. A second, slower demonstration spotlighting key points might be useful.

Activity: the main part of the lesson, getting students to do it, use it and experiment with it. Feedback should be given during the activity – based only the points given in the explanation.

Summary: get the students to summarize what they have learned (make sure to get the main points in the explanation repeated)

The iDeAfs approach can be repeated in a **Progression** to add more layers of complexity on a single skill or to merge/blend skills together.

The capital **D** of **Demonstration** and **A** of **Activity** emphasize the relative greater importance of these sections of the teaching model. Most students learn physical skills visually more than auditory, so talking should be kept to a minimum. And students learn even more kinesthetically, so time and structure for them to practice the skill is the most important. All parts are important, but more time should be spent on the **Demonstration** and especially the **Activity**.

It is good practice to extract the **Summary** from the students as way to check their understanding of the skill they have just learned.

2.2 How to Give an Effective Lesson

SPEAKING TO GROUPS - OVERCOMING FEAR & BECOMING A COMPETENT PUBLIC SPEAKER

COURTESY OF GREG WEISS

How do you feel just before getting up in front of a group to share information or an idea? If you haven't done much public speaking in your life you probably feel a fair amount of anxiety.

> *The mind is a wonderful thing. It starts working the minute you're born and never stops until you get up to speak in public." – Jacob M Braude*

If so, you're not alone. Speaking in front of others has been shown to be one of the top fears in human beings. Why is this so?

- You're normally hidden weaknesses (at least in your own mind) are exposed and magnified.
- You know mistakes will happen, and so you want to avoid it.
- You fear the unknown.
- You have not spoken in public much and so don't know what will happen.
- You have not had training.
- You don't have a strategy/plan.
- You remember the last time…

Many competent paddlers taking the ACA Instructor Certification Workshop know their stuff yet have anxiety when asked to get up in front of the group and teach it. This anxiety can be even worse than normal because you are also being critiqued by your peers. It can feel like a trial by fire if you have not taught before. However, it is important to remember that, unlike 8th grade, your 'student' peers are motivated and are in the course for the same reason; to learn how to become more effective instructors. It is a supportive atmosphere, and everyone is rooting for you. Also, the speaking skills that you learn can be used in your everyday life. It is a rare opportunity. Look forward to it!

Maybe speaking in front of a crowd isn't THAT big of a deal for you, but you still feel anxiety beforehand, or perhaps you just want to get better at teaching. Either way I want you to be successful. What follows are some things to think about while planning your presentations.

FOUNDATIONS OF A GOOD PUBLIC SPEAKER

If you have these 3 covered, your presentation is going to at least be good, if not great.

1. *Knowledge* – When we critique your workshop presentations, we look at 2 things: the "process" and the "content". The Process is HOW you present it; the Content is the WHAT and how much you are teaching about the subject. You need create a process (and a progression) that works for your students, and present quality information, the level of which depends upon the level of your audience. Additionally, you as the instructor need to know your subject in breadth and depth. Breadth helps you connect students to the subject. It's like having more tools in your toolbox and allows you to alter your teaching to make analogies, tell stories and have more fun. Having good depth of knowledge as an instructor gives you the resources to specifically challenge students no matter what level they may be at. For depth, try to read an article or two on a specific subject prior to teaching it. This will get you focused on the topic, it may provide another perspective, and help you learn at least one new thing before you teach it. Do your students a favor; don't just "wing it". You don't want to teach wrong information just to cover up your own ignorance of a topic. Saying "I don't know" is O.K. so long as you let the students know that you are interested in the answer too, and will look it up later, or ask someone, etc. Also, allowing yourself an occasional "I don't know" does wonders for your confidence in front of a group. You're saying to yourself that it's OK to be imperfect. What a relief!

2. *Preparation* – **Proper Prior Preparation Prevents Poor Performance**. You can know everything about a subject but if you don't prepare HOW you are going to present it, (the "process" as mentioned before) no one may be listening. Preparation entails making the subject engaging, using learning theory to help engage diverse students, and planning the introduction, body, and conclusion. You may want visual aids such as props or hand-outs, and you will want to set up the teaching environment. (i.e. group positioning, inside or outside, sitting or standing, etc.) You also must figure out the time needed to complete your topic (in the IDW/ICE usually only 10 to 15 minutes). There is also a danger of over preparing. When creating my teaching outlines, look at making them as simple as possible, taking out extraneous words that sound good in the planning moment, but that will confuse you during the lesson. You don't want to read from your outline, but just take occasional cues to help you get back on track if you stray a bit.

3. *Attitude* – Okay, you know your subject, and have it all planned, but your significant other decides to break up with you that morning… Your attitude during the lesson may not be the best, right? As the presenter, you are affecting the mood of the whole audience. Are you sad, fearful, calm, uptight? Do you feel like your audience is beneath you or do you lack confidence? Are you too easy going or a tight wad? Your attitude is like a boomerang that will come right back at you once the audience catches on. Come in with a laugh and you'll have them laughing with you soon. Take yourself too seriously and they may take you too seriously. This is supposed to be fun, remember?

YOU ARE ON STAGE!

Like it or not, so think about this:

- Introduce yourself. Perhaps shake everyone's hand when they come in. You are their interpersonal role model.

- Tell stories. Since time immemorial humans have been relating information through story, not lecture. Stories have characters and emotion. Monologues are sterile. Everyone likes a juicy story.

- Some famous orators have trained their enunciation by practicing speeches with pebbles in their mouths, practiced projecting their voices by speaking near a roaring rapid, and took acting lessons to better understand the non-verbal aspect of communication. What are your distracting weaknesses and how can you improve upon them?

Teaching in the Outdoors – Methods & Tips

Introduction

When teaching outdoors, you are either working with your environment or competing against it for your student's attention. The wise teacher lets "the mountains speak for themselves" when appropriate.

Good teaching empowers students and ultimately enables them to become independent. The more you can engage the learners, the better.

1 The Basics

Be aware of your Environment: Constantly evaluate! How may the current conditions jeopardize safety and comfort? Assess temperature, how students are dressed, the noise of the wind or the river, whether the sun is in their eyes, is there wildlife? Distractions from other people?

Create your classroom: Make sure students are comfortable and ready to learn. Are they seated or standing? Can they see and hear you and each other? Don't be afraid to move or reposition your students. Place them with their back to the sun. Cancel a class or delay it if the conditions are not suitable for learning. Use tarps or tents to teach in if the conditions are wet.

2 Use Visual Aids and Props

Teach to all learning styles and enhance any straight lectures.

- Carry a teaching kit (washable markers, white plastic bag or Mylar).
- Tape information on a person.

- Draw on a body as a visual board for teaching physiology.
- Try using a globe of the world to teach latitude and longitude and declination. You can also try playing a short game to keep the ball from hitting the ground.
- Try props to get into character to teach a topic and make it funny or fun.

Good visual aids enhance your teaching. Bad ones only distract and frustrate your students. Take time to prepare your visual aids well. Use props that create interest and fun. Make sure that they are light and easy to carry or can be used for other purposes.

PROCESS: Creative Ways to Teach Your Content

Chaining: A good example of this is rolling, where a step by step approach, ensuring that each link in the chain is strong before moving on to the next. Reverse Chaining is where you start with the whole, then break it down into component parts going back down the chain.

Debate: Group learns trough debating with each other. For example, separate into two groups and debate a topic such as skegs vs rudders.

Demonstration: Show a group how something works. For example, use a rope to show short period and long period swell.

Discussion: For example, teach LNT ethics through a group discussion about the pros and cons of where to cook.

Educational Games: For example, play a round or two of Coastal Kayaking Jeopardy to reinforce what the group previously learned.

Guest Speaker: Leader comes in and talks about something while impersonating a famous person.

Guided Discovery: Help students discover knowledge instead of just feeding information.

Interactive (Reciprocal): involving two or more students. One performs the activity while the other provides feedback. This allows students to cement their understanding of the skill and help each other. It is particularly useful if you have a large group and a wide range of ability. The more skillful paddlers can assist those needing more help.

Journaling: for self-reflection or group reflection. This gives a group a common place to share thoughts and memories.

Problem Solving (Student Centered): instructors facilitate as students work individually or collectively to solve a problem. It may eat up a lot of time.

Role Play: Some students will enjoy this method; others will hate it.

Seeded Questions: Hand out a series of questions to various students in the group and cue them to ask you the question.

Simulation: Plant a student or leader in the audience to act out something that you want to teach. For example: someone in the audience starts bleeding heavily and then the leader treats the patient and then teaches class how to treat.

Skits: Get the students involved or entertained watching you or your assistant act something out – make it funny or at least memorable.

Solo: Have students paddle alone or sit alone for a designated time to encourage reflection. Voluntary.

Storytelling: Use a story to teach a lesson.

Task: Give the students a specific task or activity to perform. You may have to model the activity and explain it first.

Talk Show Host: Leader dresses up and interviews students.

Teachable Moment: Stopping an activity to point out an educational piece. A journey can be planned that will ensure there are many teachable moments that will be encountered along the way.

Visualization: A powerful tool if managed effectively. It will likely require some knowledge and experience of the topic by participants. Create a safe, comfortable space and take the time necessary to allow everyone to get inside their heads.

LESSON PLAN FORMAT

A lesson plan is an effective tool for outlining and preparing a topic for instruction. It will help you to plan your presentation and focus on important factors. This is just a template. Be flexible with your lesson plans; you can vary the format somewhat, depending on the type of lesson or presentation.

1) **Goal** – The goal is the end result and overall purpose of what you are teaching. For example, the goal of a roll class is to learn how to do an Eskimo roll in order to recover after a capsize.

2) **Objectives** – Objectives are measurable and observable outcomes of the lesson. They provide the means to attain your goal and give you specific items to focus on. For example, in a roll class, the student will learn a. Correct set-up position, b. How to lean the boat and perform a "hip-snap", c. Paddle position & movement, and d. Keep head down to complete the roll.

3) **Methods** – Describe the methods you will use in your class or presentation. Methods may include: Lecture, demonstration, specific activities, discussion, leading questions, visual aids, tasks, etc. The methods you use will determine your style of instruction. Try to make the style interactive and experiential. Avoid excessive lecture.

4) **Content** – This is the substance of your presentation. Include the facts and information that you want to impart to the student. For any given topic, you need to synthesize and focus on the relevant information that you want to present.

5) **Equipment** – What equipment or materials will you need? List each item and quantity. Examples: Whiteboard, pens, kayaks, paddles, miniature kayak, compass, chart, etc.

6) **Other Factors** – Depending on the presentation topic, there may be several other factors to consider. These include the following:

a) Where will the lesson be taught; be sure to choose a suitable site.
b) Length of presentation; what and how much you cover depends on your time frame.
c) Alternatives – You may want alternative plans for foul weather, etc.
d) Evaluation – Evaluate your lesson afterward to determine if it was successful; were objectives met? What worked and what didn't work?
e) Reference materials – If appropriate, give handouts or references to support your lesson.
f) Follow up – What is next for the students? How can you prepare them for the next lesson?

EXAMPLE LESSON PLAN

Paddling Concepts

GOAL:
To gain an understanding of physical and mental concepts that forms the foundation of good paddling technique

OBJECTIVES:
Students will learn about…

Body: torso rotation & the "paddlers box"
Blade: vertical blade for power/angled blade for support
Boat: transfer of power from paddle to boat

METHODS:
Guided discovery

CONTENT:
Mechanics:

- Hand position on paddle shaft
- Position of paddle at catch phase
- Height of top hand
- Position of top hand relative to shoulder
- Force arrows - (Newton's Third Law).
- Move the boat, not the paddle; grab water, then apply force
- Muscle firing sequence

EQUIPMENT:
Seat pad, paddle, child's toy arrow

OTHER:
Length: 10 minutes. Location: On the beach

Hand-out: by email

Follow Up: On-Water activity utilizing Forward Stroke progression drills

2.3 Differentiated Teaching

If we recognize that we all have different personalities, body types, physical abilities, Learning Preferences, and goals it stands to reason that it is important to pitch your teaching at the appropriate level for each of your students and adapt your approach per the context of the lesson and each individual student's needs.

Humanistic, student-centered, differentiated teaching must be a cornerstone of your teaching. If you find yourself teaching to a curriculum instead of providing what each student needs, you should at the very least ask yourself why. There may be legitimate reasons: e.g. safety, lack of personnel or resources, but these should be addressed in future lesson planning.

"Driven by the Student; Steered by the Coach"

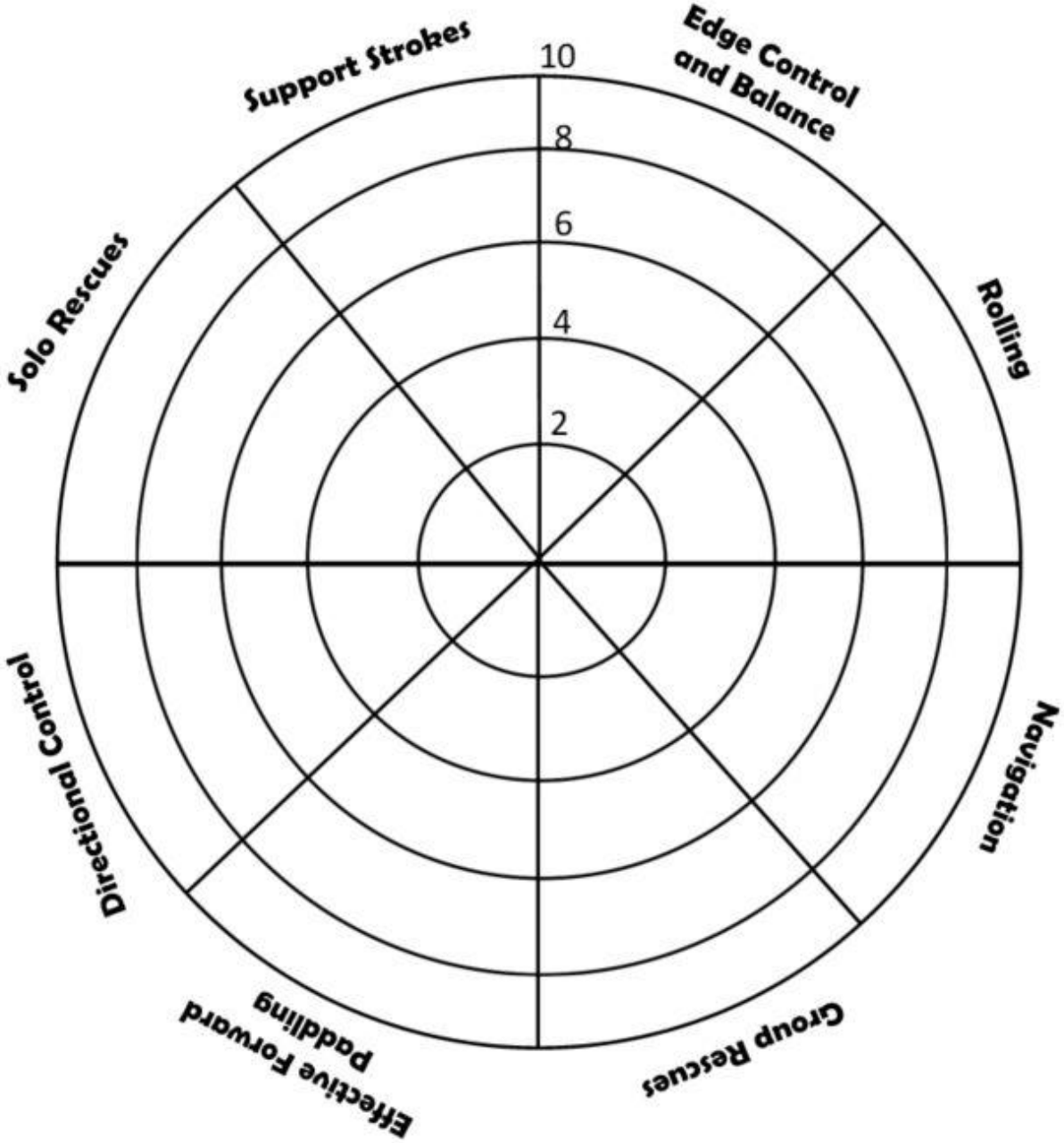
Time should be spent at the start of each session evaluating your students, and the content of the session should be adapted accordingly. It is a common mistake to teach to the lowest skill level, leaving more advanced students needing more or neglect those that are struggling with a skill or concept because others have already moved on. Being flexible and imaginative are great qualities for an instructor. Constantly challenge yourself – are you giving your students what they need?

A great way to start the coaching process is to have your students evaluate their own paddling performance. Doing this before and after a session or series of sessions will at least reveal your student's perception of how they are developing.

An example of a self-evaluation tool is shown below:

PERFORMANCE PROFILE

NAME _____ DATE ___/___/___



Starting in the centre shape each sector to indicate how you'd grade you own ability

www.committed2thecore.com

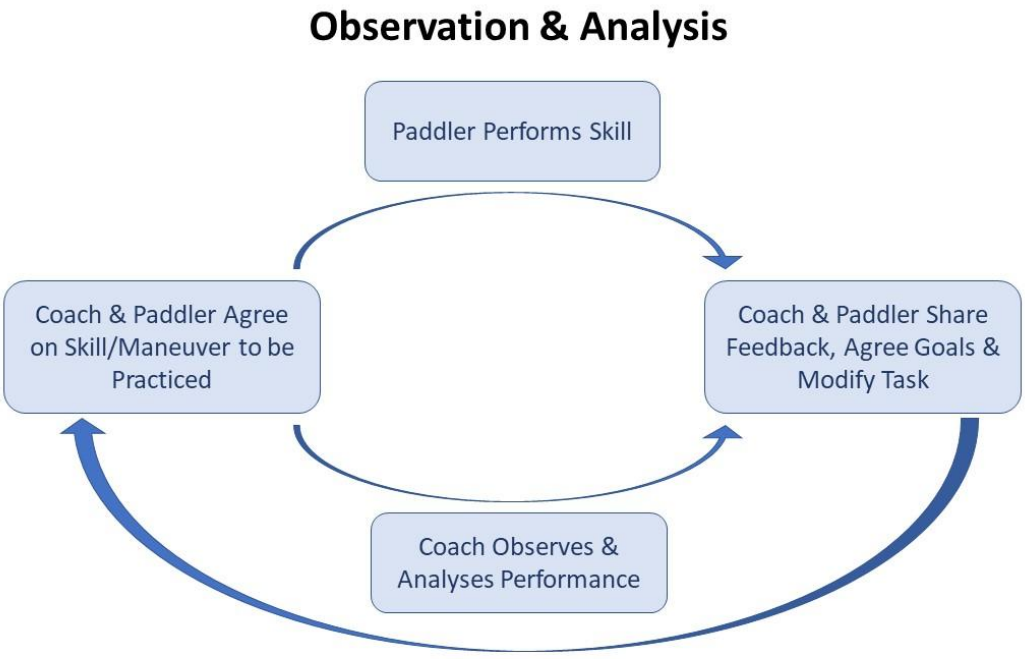
2.4 Observation, Analysis & Assessment

Three words that mean very different things but are key parts of the coaching process.

It is critical to evaluate your students at the start of a session. There are many ways to do this, ranging from a simple introductory discussion of previous experience to an on-water skill challenge. An assessment of skill is a critical part of any lesson plan that has a focus on skill acquisition. How can you differentiate if you don't know what you have? How will you know if your students have benefitted from your coaching if you do not have a baseline to start with?

An initial assessment is even more important for advanced level classes where students will be encountering hazards. The assessment should be undertaken within a safe environment, close to your launch location and contingencies put in place to deal with any student(s) that you assess to not have the skills necessary for the class.

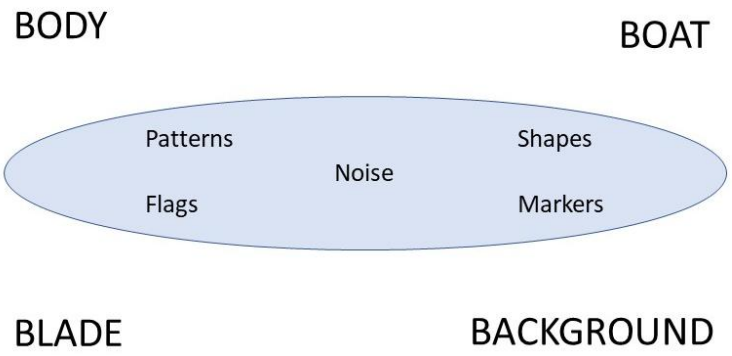
Before you can assess, you need to observe and analyze the performance.



ANALYZING PERFORMANCE

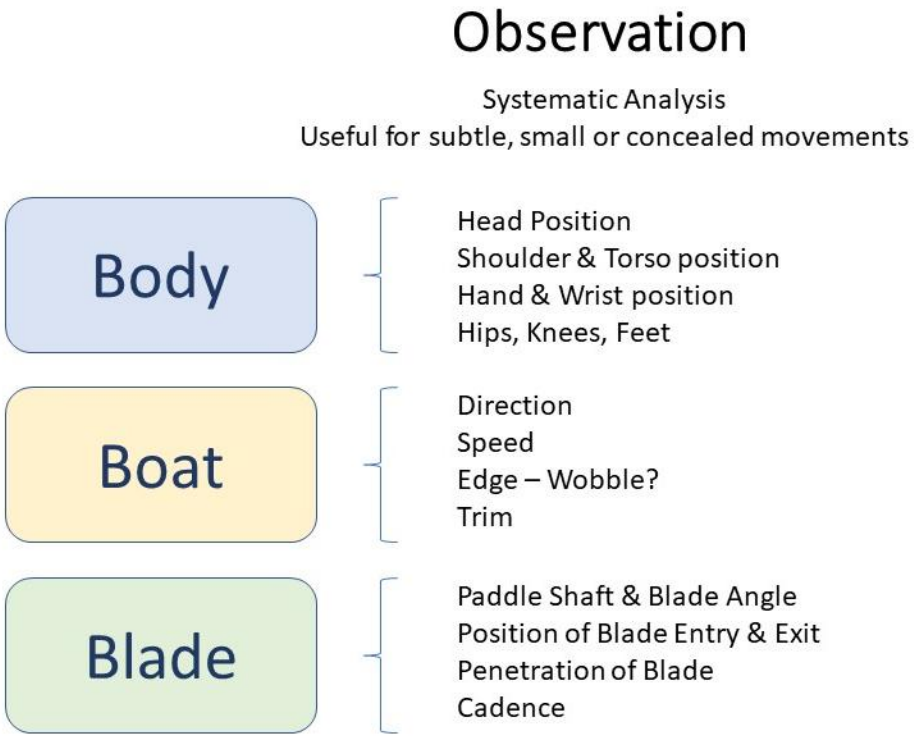
There are factors to consider when observing and analyzing performance:

- Time – give sufficient time for the evaluation – it may be some time since your student has been in a boat. Give them time to work out any chinks.
- Move around – observe from different angles.
- Observation funnel – holistic (big picture) down to specific. What are you seeing overall? What specific components of the technique are influencing the performance?
- Deductive – if you can see a problem, what is the cause? There may be several possible causes – what is the actual cause of this problem for this individual? The 4xB's model is a good place to start.



Observation Tools

- **Flags:** be aware of indicators that flag up certain actions. Flags indicate that something is or isn't happening. e.g. face coming out of the water first when rolling indicating a lift of the head.
- **Markers:** markers enable us to measure outcomes. Buoys, docks, rocks, tape on paddle shaft or boat, water to the seam line or cockpit coaming.
- **Noise:** is the paddle entering the water quietly or making a splash?
- **Bubbles:** is the blade moving water (more bubbles) or moving the boat (less bubbles)?
- **Rhythm:** Is the paddle stroke rhythmic or jerky?
- **Shape:** Examples could be J-lean, shape of the paddler's box, shape of the wake or bubble trail.
- **Symmetry:** is the stroke even and equally as effective on both sides?


Observation
Systematic Analysis
Useful for subtle, small or concealed movements
Body
Head Position
Shoulder & Torso position
Hand & Wrist position
Hips, Knees, Feet
Boat
Direction
Speed
Edge – Wobble?
Trim
Blade
Paddle Shaft & Blade Angle
Position of Blade Entry & Exit
Penetration of Blade
Cadence


Body
Torso, Shoulders, Arms, Feet, Legs,
Hips, J-Lean, Head Tilt, Posture, Clothing
Blade
Depth, Angle, Weight, Grip,
Movement, Power Transfer, Recovery
Boat
Design, Equipment on Deck,
Surge, Heave, Sway, Roll, Pitch, Yaw
Background
Wind, Waves, Current, Landmarks, Buoys,
Stationary Objects

ASSESSMENT

Formal skills assessments have long been a feature of the BCU Star Program, and the ACA Instructor Certification Exam and Skills Assessments. The ACA's Level 1 to 4 Coastal Kayak Skills Assessments have recently become more important since they are now a prerequisite for Trip Leader and Instructor Training. This makes the topic of Assessment particularly relevant and significant and begs the question, how do we assess?

THE ASSESSMENT PROCESS

There are two important aspects of conducting any assessment. The first, is how the assessment is structured. The second is identifying the parameters of what is a passing performance vs one that needs more development.

FORMATIVE VS. SUMMATIVE ASSESSMENT

It should be made clear at the start of the program the mode of assessment that will be used – **formative** or **summative**.

A formative assessment process is an assessment *for* learning, designed to inform your coaching, plan your instruction and enable learning to take place as part of the coaching process. Candidates should be given feedback on their performance on a skill area and given the opportunity for a redo if appropriate. The candidate is assessed across the body of work that is produced during the assessment. Typically, a formative assessment would take place over several days or weeks to enable learning to take place and provide enough time for measurable improvement. A multi-day Instructor Certification Workshop is an example of a formative assessment process, where feedback can be given to a candidate, the candidate can reflect on their performance overnight and try again the next day.

A summative assessment process is an assessment *of* learning – a snapshot evaluation of where the candidate is at that time and would typically not allow for a redo. Skills Assessments and Instructor Certification Exams are examples of summative assessments.

The intent is that candidates own the skills; it is not about coaching their performance to the standard in a short period of time but that the assessor has reasonable confidence that candidates can repeat their performance next week or next month.

Coaching a candidate to improve their performance may not desirable in the context of a summative assessment, coaching for clarity is likely always appropriate. A demo of the skill to be assessed may be appropriate. Asking "try and make the next turn a little tighter" is appropriate. "On the next turn edge more to the outside and open up the blade face more on the bow rudder" may not be appropriate.

The goal is to get a true-life picture of a paddler's performance and compare it against set criteria. The best way to see a true performance is to make the assessment as organic and

authentic as possible. Assessments are inherently stressful for both the candidates and the assessor. Reducing that stress as much as possible should be a goal.

Assessment Structure

The Assessment process should cover the WHAT, HOW, WHY format.

- **WHAT – Authentic tasks in appropriate conditions**
- **HOW – Effective observation and objective analysis of performance**
- **WHY – Check of understanding**

Assessment of KNOWLEDGE

Assessment of knowledge is relatively straightforward. A carefully crafted knowledge check will indicate a candidate's recall of facts and may reveal a level of understanding. A knowledge check should be followed up by a practical application of the knowledge to gauge cognitive understanding of when and how to use the knowledge.

An interactive, peer to peer reciprocal coaching technique used carefully under close supervision will help students to display and cement their knowledge and understanding and allow the instructor to observe and assess who needs more individualized attention.

Assessment of SKILL

Assessment of skill can tend to be more subjective and opinion, or a preference for a style or technique can creep into the assessment process. Preconceptions can blur perception.

To avoid subjectivity, you may challenge a student with a specific task – e.g. perform a roll; launch from a beach and paddle to the outside of the impact zone. Either they are successful, or they are not.

Consider:

- Was it **SAFE**?
- Was it **EFFECTIVE**?
- Was it **EFFICIENT**?

Safe and effective may be less controversial; efficient can be subjective and based on opinion. Using a stopwatch to time the performance of a task is one way to make the assessment of efficiency more objective. How much do we factor in age, gender, body type, physical limitations, boat design, paddle design and length?

An instructor candidate needs to be able to effectively model strokes to show the teaching points and paddle with 'style and grace' in conditions commensurate with the level they are teaching in.

Two common versions of assessment.
Using this line item from L3 CK SA as an example:
"Turning with forward momentum—demonstrate the ability to turn their kayak with a variety of techniques with forward momentum to include: edging, bow rudders, stern rudder (to go straight) stern draw, stern pry and low brace turn"

Version A
Assessor says, "go make a bow rudder turn around that buoy" and then "Now go back and turn the other direction"
Assessor says, "go make a low brace turn around that buoy" and on down the list.

Version B
Assessor sets up a 3-buoy triangle course with each turn requiring a different turn radius and says "we are all going to circumnavigate these three buoys. Use a different method at each buoy to make the turn" It may take 3 or more circuits to see everything the assessor needs to see. "Next we'll do the same thing going in the opposite direction."

Version A is relatively fast and makes the assessor's job slightly easier as they are only observing one performance at a time. This is an instructor-centered approach that tends to increase stress on the candidate as there is a sense that the assessor plus the entire group is watching them. It also means there will be a fair bit of sitting around waiting for your turn. In a pure instructional environment observing our fellow paddlers can be very beneficial but during an assessment the effect is probably a net negative one. Version A can be an effective "near the end of the day and I haven't seen "X" from Bob yet" technique.

Version B is more challenging for the assessor. There is a lot happening simultaneously. It has the advantage of lowering stress on the candidates as everyone is performing the same thing at the same time and no one person is in the spotlight. It also has the advantage of being somewhat open ended in that the candidate can decide what stroke or technique to use and when. This provides additional contextual information to the assessor (did the candidate choose the most appropriate technique to make the 3 different arcs?)

Assessments take place on at least 2 levels:

- The granular level: "Was their bow rudder on the left at the standard or below the standard?"

- The holistic level: “Was their overall performance today at the standard or below the standard”

The granular level is relatively easy to document. The holistic level is more of the assessor's overall impression and gut feeling based on the cumulative granular evidence. If an assessor’s gut feeling differs from the documented performance, the granular documented evidence should take precedence.

How do the range of environmental conditions affect the assessment for a candidate’s performance?

Most skills assessments list a range of environmental conditions which must be present during the assessment. 2-4-foot waves or 10-20 knot winds etc. When an assessment takes place where the minimum conditions exist, it is reasonable to expect a very solid performance from the candidate. If conditions are at the upper end, concessions may be made. For example, the amount of edge and stability of that edge during a turn might be less at the upper end of the environmental conditions and considered a “pass” if the maneuver was still effective.

Record Keeping

It is imperative that there is some form of documented evidence of a candidate’s performance. This might take the form of contemporaneous notes or video that can be reviewed later.
A scoring rubric or matrix can be used, listing specific strokes, skills and knowledge broken down into the component parts. The American Canoe Association (ACA) has just introduced an online Course Management System (CMS) that has built into it a rubric using the phrases: “Exceeds, Meets, Developing, Continued, Not Observed”. It could be argued that this rubric still provides limited feedback for the candidate.

The following documents can be used to quickly check off the various items:

L3 IDW/ICE Candidate Evaluation Form

Candidate:_____ **IDW / ICE Dates:**_____ **IT(s):**_____

Strokes & Maneuvers: (Effectively and efficiently perform, assess and teach in L3 conditions)
Demonstration quality (circled component needs improvement – *suggested maximum of 4 for certification*)

Forward	Torso Rotation	Catch	Exit	Hand Position
Reverse	Torso Rotation	Catch	Power	Directional Control
Stopping				
Forward Sweep	Torso Rotation	Catch	Extension	Edge
Reverse Sweep	Torso Rotation	Catch	Extension	Edge
Standard Draw	Torso Rotation	Vertical Shaft	Steady Upper Hand	Smooth Motion
Sculling Draw	Torso Rotation	Vertical Shaft	Elbow Tucked	Smooth Motion
Low Brace	Elbows Up	Edging/Hip Snap	Slap & Recovery	Timing
High Brace	Elbows In	Edging/Hip Snap	Slap & Recovery	Timing
Sculling Brace	Elbows In	Active Blade	Smooth Motion	Recovery
Bow Rudder	Initiation	Vertical Shaft	Blade Angle	Edge
Stern Rudder	Torso Rotation	Parallel Shaft	Pry/Draw	Front Hand Height
Low Brace Turn	Initiation	Low Brace	Edge	Recovery
High Brace Turn	Initiation	High Brace	Edge	Recovery
Side Slip	Torso Rotation	Vertical Shaft	Straight Line	Maintain Speed
Rolling	Hip Snap	Horizontal Shaft	Head Last	Finish Position

Boat Control: **Edge Awareness** **Launching & Landing** **Paddling & Maneuvering**

Rescues (Effectively and efficiently perform, assess and teach in L3 conditions)
(circled component needs improvement – *nothing circled for certification*) Notes:

Wet Exit (with skirt)	Perform	Teach
Self-Rescues x 3	Perform	Teach
Boat over Boat	Perform	Teach
Bow/Stern/Paddle	Perform	Teach
Scoop	Perform	Teach
Hand of God	Perform	Teach
Swimmer Recovery	Perform	Teach
Re-Enter & Roll	Perform	Teach
Contact Tow	Perform	Teach
Line Tow	Perform	Teach
Rafted Tow	Perform	Teach
Bulldoze	Perform	Teach

Knowledge Lesson: <- Exceeds - Meets - Developing -> Notes:
Content: <----------> _____
Style: <----------> _____
Skills Lesson: <- Exceeds - Meets - Developing -> Notes:
Content: <----------> _____
Style: <----------> _____

L3 IDW/ICE Candidate Evaluation Form (Continued)

Candidate:_____

ACA Knowledge	<- Exceeds - Meets - Developing ->	Notes:
General Knowledge of Paddlesports	<---------->	_____
Register & Report a Course - Insurance	<---------->	_____
ACA Waiver & release of Liability	<---------->	_____
Teaching Ability	<- Exceeds - Meets - Developing ->	Notes:
Teaching Theory	<---------->	_____
Differentiation	<---------->	_____
Progression	<---------->	_____
Venue Selection	<---------->	_____
Core Principles	<---------->	_____
Feedback (PSC)	<---------->	_____
Demonstration/Modeling	<---------->	_____
Interpersonal Skills	<---------->	_____
Organization & Management	<---------->	_____
Incident Management	<- Exceeds - Meets - Developing ->	Notes:
Communication & Signaling	<---------->	_____
Situational Awareness	<---------->	_____
Leadership & Judgment	<---------->	_____
Avoid, Assess, Manage – Injuries	<---------->	_____
Avoid, Assess, Manage – Cold	<---------->	_____
Discipline Specific Knowledge	<- Exceeds - Meets - Developing ->	Notes:
Safety Issues & Hazards	<---------->	_____
Float Plans	<---------->	_____
Equipment Selection & Packing	<---------->	_____
Weather Forecasting & Interpretation	<---------->	_____
LNT, Conservation, Stewardship	<---------->	_____
Cold Shock, Hypo/Hyperthermia	<---------->	_____
Signaling Devices & Safety Equipment	<---------->	_____
Kayak Design & Equipment	<---------->	_____
Kayak Towing (equipment/principles)	<---------->	_____
Navigation	<- Exceeds - Meets - Developing ->	Notes:
Basic Chart Reading & Use	<---------->	_____
Boat Traffic & Rules of Nautical Road	<---------->	_____

Level 3: Coastal Kayaking Skills Assessment

(VENUE: lakes or coastal waters, within 1.5nm from shore, 10-15kt wind, 1-2ft chop, 1-2ft surf, 1-2kt current)

STROKES & MANEUVERS (in L3 Conditions)		#1: P/N	#2: P/N	#3: P/N	#4: P/N	#5: P/N	Notes
Lift, Carry, Launch/Land: safe technique in variety of contexts							
Effective Forward Paddling: maintain speed and direction in conditions							
Stop: from good speed: (< 4 strokes?)							
Spin using fwd./rev. sweeps and edging							
Effective Reverse paddling: w/ directional control & turning w/ edging, etc.							
Turning on the move: w/ edging							
Stern rudder, stern draw/pry combo							
Turns on Move: initiate w/ sweep and appropriate edging	High Brace Turn						
	Low Brace Turn						
	Bow Rudder						
Sideways with forward momentum: i.e. Side Slip, draw on move							
Draws: both sides w/ directional control	Standard to hip						
	Sculling						
Braces: prevent capsize from well off balance	Low Brace						
	High Brace						
	Sculling Brace						
Ability to Maneuver in L3 Wind & Sea Conditions	Paddling comfort in beam/following/ quartering seas						
	Ability to hold position and perform rescues						
Negotiate L3 Surf (1-2', if one of 4 conditions)	Hold Position						
	Launch/Land						

RESCUE/SAFETY (in L3 Conditions)	#1: P/N	#2: P/N	#3: P/N	#4: P/N	#5: P/N	Notes
Effective wet exit: demonstrate a controlled wet exit with spray deck in L3 conditions.						
Self-Rescue of choice in timely fashion: i.e., paddle-float, reenter roll, cowboy-scramble, etc.						
Deep water assisted rescue: demonstrate a variety of rescues in L3 conditions						
Bow, Stern, Paddle & Cockpit Recovery: demonstrate confidence as the capsized paddler.						
Towing: demonstrate proficiency in single, in-line, rafted & Contact Tows						
Swimmer Rescue: stern toggle tow, bow push, back deck						
KNOWLEDGE:	#1: P/N	#2: P/N	#3: P/N	#4: P/N	#5: P/N	Notes
Weather: able to explain the effect of weather on kayakers and show knowledge of various weather resources.						
Hazard Assessment / Avoidance: understands dangers of L3 conditions and how to avoid, including Nautical Rules of Road / Boat Traffic, etc.						
Basic Navigation / Trip Planning: able to interpret basic chart datum, plot a course and adjust for variation						
Recognition and avoidance of Hypo/Hyperthermia and Cold Shock						
Leave No Trace: possesses fundamental knowledge of (LNT) skills and ethics.						
Group Awareness and communication: demonstrate understanding and proper use of on-water signals and the importance of maintaining group coherence.						

Does an assessor's prior history with a candidate play a role?
An assessor's prior experience with a candidate whether positive or negative cannot be considered as part of the assessment. Prior experience with a candidate may inform an assessor's assessment plan.

For example, "I know Bob has been struggling with his sideslip to the left, I need to make sure he has the opportunity to perform it in multiple places." Or "I've seen Bob make some pretty sketchy safety decisions while rock gardening, I need to make sure he gets the opportunity to make enough rock gardening safety decisions."

Assessments are a snapshot of a paddler's performance. We can only assess what we see on the day of assessment. If it's a required skill and a candidate has missed all their rolls during the assessment even though the assessor has witnessed dozens of successful rolls prior to the assessment, the candidate cannot pass on that day. The inverse is also true. If you've never seen the candidate make a successful roll the entire prior year yet they nail it at the assessment, it's a pass.

When do you give a result?
Some candidates want feedback after every activity - "was that a pass?" Others are completely devastated by one blown bow rudder. It's up to the assessor agreeing with each participant as to when or how often to provide feedback.

When is the best time to give the result?
It is typically beneficial to give the candidate their result as soon as possible. Ideally, either on the paddle back or once off the water but before a formal debrief. This gives them a chance to mentally process their result, positive or negative and will put them in a better place to receive their feedback. If you wait until the debrief to provide their result, they likely won't absorb much of your feedback.

Should you ever give a negative result prior to the end of the day?
There may be a point where an assessment is going particularly badly for a candidate. The assessor may choose to take that person aside and let them know they are not going to pass today. That removal of performance anxiety can be beneficial to the candidate and they can spend the rest of the day still being "assessed" but with nothing "on the line". They will receive the same level of feedback as everyone else, but the remainder of the day will be considered additional training towards their next assessment.

Giving Feedback

Remember that feedback should be POSITIVE and SPECIFIC.

Feedback options:
Group feedback or individual feedback?
Individual feedback should always be offered as an option but giving individual feedback within the group is also acceptable. The question of whether someone would prefer a private session, or a group session should be delivered individually so as not to make anyone feel peer pressure to receive feedback within the group. Unless there is a strong majority favoring a group session, private sessions should be delivered.

If individual (private) feedback sessions are going to be used, they should be initially kept to under (5?)

minutes. If the candidate feels they need additional feedback past their 5 minutes, they should wait around until all other participants have had their feedback session. If doing private feedback sessions, it is common practice to let the candidates sort themselves in order of time constraints (longest drive home, must catch a flight etc.)

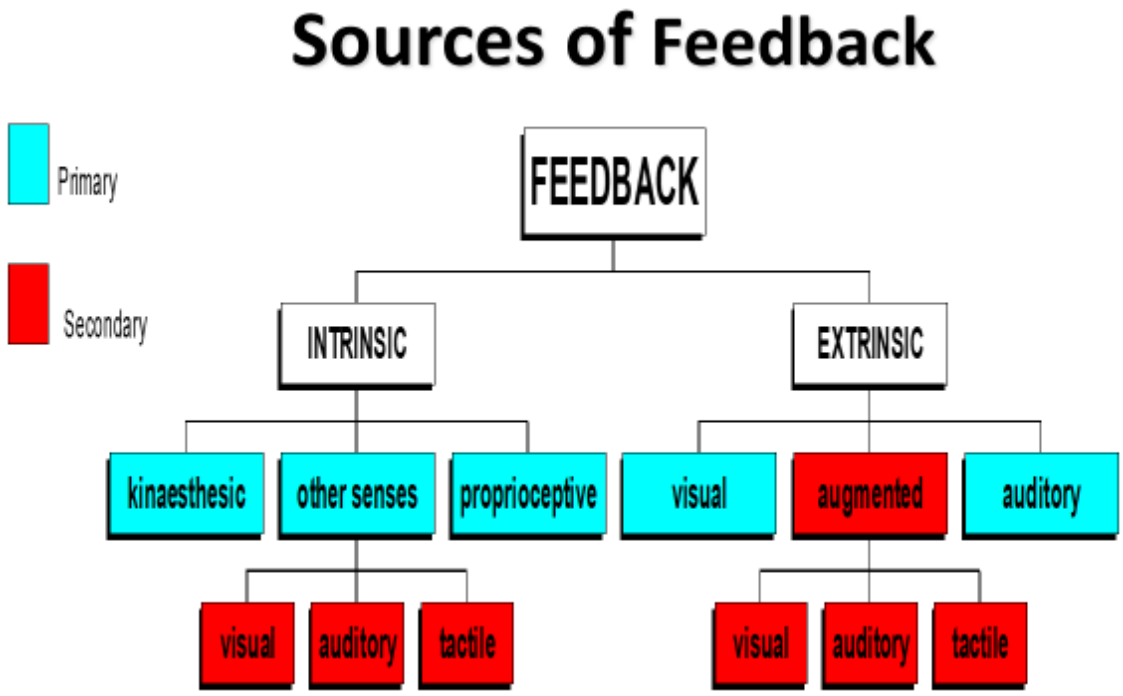
End of day might look like:

- Group wrap-up meeting, participants give feedback as to how they felt the day went and the opportunity to tell the assessors what went well and what aspects of the course could be improved.
- Individual feedback given either within the whole group or in private sessions.

2.5 Feedback

Feedback is a critical part of the teaching/learning process and there are essentially two types:

- **External (Extrinsic) Feedback** – the environment, the instructor, peer to peer, video
- **Internal (Intrinsic) Feedback** – the individual's own feelings and senses



External Feedback

External Feedback should be Positive, Specific and Congruent.

PSC Feedback

***Positive*:** Reinforce what they are doing well. Avoid focus on what they're doing wrong. Instead, describe how to become more effective.

***Specific*:** Feedback should be clear and directive. Avoid saying "you're doing well." Instead, say "you're doing well because your top hand is high, your top elbow is relaxed and you're rotating well through your entire torso."

***Congruent*:** Feedback should be directly related to what the participant is doing. Give feedback about ferries when you do ferries.

It is important when giving external feedback that it is specific and related to instruction that has already been given. For example, if teaching the forward sweep stroke, you should only give feedback on the teaching points that have already been covered. Don't suggest that that the student use edge if you have not properly introduced that concept.

Consider using this framework: **Example**, **Effect**, **Change** or **Repeat**

Example – what teaching point are you specifically commenting about? "This is what I observed" …

Effect – what effect does the technique have? Is it working?

Change – does the technique need to be changed? If so how?

Repeat – if the technique does not need to be changed, encourage the student to repeat it.

Video Analysis

Making a video recording of your student is an additional form of external feedback. Used wisely it is an invaluable tool. Applications such as Coaches Eye allow for frame by frame analysis of technique.

Students and especially instructor candidates can get stressed by just the thought of being filmed. Factor performance anxiety into the feedback given.

Be mindful that this might be the first time a student has seen themselves perform and can be distracted by their personal self-image and it might take time for them to be able to focus on the detail of a technique.

Some students may become disheartened by seeing themselves on video. The camera never lies and what they see might not match what they imagined they looked like.

Consider the environment when choosing a location to film from – sunlight, shadow, safety. Avoid distractions – conversation, traffic noise, excessive camera shake.

Try to frame the video - zoom in to focus on one aspect of technique, zoom out to show effect.

Use markers such as buoys or docks to show how effective a technique is. Compare like with like – count the number of strokes it takes to perform a pivot turn for example.

Project the video onto a whiteboard – this will allow you to draw on the whiteboard to show angles, make notes or emphasize points.

Be sure to use the video as a motivational tool and avoid being too critical. Focus on what your student is doing well.

Internal Feedback

We receive internal feedback all the time, but it often gets lost in the noise of the environment around us. Novice paddlers will find it particularly hard to focus on internal feedback and will need your help to tune in to what their body is telling them.

Developing a 'feel' for the water is a significant milestone on the way to becoming a paddler. If we neglect the internal feedback our bodies are giving us it takes us longer to acquire skill and confidence.

Guided Discovery is a great way to encourage a student to start tuning in intrinsically to what their body is telling them. Have them try different methods or techniques to achieve a result and ask them to feel what is best.

For example, a bow rudder with and without a forward sweep stroke to initiate, with and without edge – inside edge, then outside edge. Don't just focus on what is effective, ask what feels best on the body?

Receiving Feedback

As instructors, we should be seeking feedback from our students. It might be verbally as part of the wrap up at the end of the session or in a written evaluation. Encourage students to give you feedback once they have had time to reflect on the program you have delivered.

2.6 Practice

After all practice makes perfect! Right?

Dave Rossetter – Paddlesport Instructor at Glenmore Lodge

This article is about practice and more especially the quality of the practice. I aim here to look at:

- types of practice
- challenge and context within practice

A few quotes to get us going:

"Practice does not make perfect. Only perfect practice makes perfect."

Vince Lombardi – American football coach

"Knowledge is of no value unless you put it into practice."

Anton Chekhov – Russian physician

Getting the theory behind 'what' we need to do, 'why' we need to it and 'how' we need to do it is important. It helps us as paddlers formulate a set of rules that can aid us in the appropriate selection of techniques or tactics for a particular situation. When we are under pressure it gives us a base to fall back onto. However, without practice it is perhaps wasted information and something that doesn't help in our performance.

Whatever the theory is we need to trust it. We need to take ownership of the information and make it our own. If we own and trust the theory, it sticks, and we are happy to have it as our fall back.

However, paddling is dynamic, fluid and rhythmical. We paddle in dynamic environments where we need to respond quickly and efficiently to achieve the desired outcome. The background

information aids us in our planning and helps with the start point. This is where we need to have flair and creativity in our performance. This is particularly true in the advanced conditions. The more advanced the conditions the quicker the decisions required in the constantly moving environment.

The dynamic nature of the environment requires us to be able to adapt the our 'rules' and find solutions often in the middle of activity. To help us with this we need to look at the types of practice we do.

Three main types of practice:

- **Blocked**
- **Varied**
- **Random**

BLOCKED PRACTICE

'Same skill, same effort, same environment – repeated over and over'

Brilliant for grooving and gaining skill development especially good for early stages of skill development as well as later stage development when looking to solve a problem.
The challenge of blocked practice can be in that dynamic environments, things do not happen the same. The water level is higher/lower, the wind is a slightly different angle, the boats packed differently etc.
Therefore, we need a different approach. The skill we have been practicing is what we will fall back onto because that worked in the past. That is no guarantee of the outcome this time. That can lead to frustration and/or lack of motivation to continue.

VARIED PRACTICE

'Same skill with changes – speed, effort or environment'

A great way to test the skill in different environments. Due to paddling in an ever changing environment we need to have slightly different blend of techniques and tactics to achieve the desired outcome.
For example, the outcome is crossing the eddy line. If we practice doing the same thing in only one place and one way what happens when we move to a different type of eddy?
By having the skill at a level where the paddler can then take it and apply it to a different situation. This is vital for paddlers as the conditions we are in vary. Therefore, adding variety to your practice will aid you in the long term.

The experiences that we have if they are varied will give us greater options for our paddling. This is recognized by the National Governing Body where for example, asking paddlers to paddle in different geographical areas is helping with them having variety of options to achieve different outcomes.

RANDOM PRACTICE

'Skill is practiced and then left as different skills are being worked before coming back to the original skill'

When we paddle, we must blend a lot of skills together. Using the river example, we paddle out of the eddy, down through the rapid which may include avoiding different obstacles, break out before having to then break in again. This using the skill, storing the skill and then recalling it is vital when the environment demands so much from us. When there is so much interference then having the strategies that allow us to recall what we need when we need is the key to a successful performance.

Bi-lateral
One that we should all be aware. What side do you practice on? How many have a roll that only works on one side.
Practicing consciously on both sides is a great way to transfer information from one side to the other. You know when one side is working, and the other isn't. Focusing on what those differences are, is a great teacher.
The environments that we paddle in demand that we need skills on both sides regardless of what craft we are in. Turning left and right to avoid obstacles, surfing a wave or a move that is better going left instead of right. As much as anything it keeps the body equal and uses all muscles ranges and not just one side.

Challenge and context within practice
Having knowledge of different practice structures gives the ability to understand the context of our training. We know that we can change how we train depending on what the problem is that we need to solve.
If we are looking to groove a skill, add flow or rhythm to our paddling then we can change the practice to suit. However, we can also add challenges to the practice.

Examples of challenges:

Easy environment – hard moves
On easy grade water look to add the challenge by making harder moves. Looking for effective paddling that leads to efficiency.

Easy environment – easy moves

Improving the efficiency of the move seeking perfection.

Challenging environment – easy moves
Problem solving blending a mix of factors to solve the problem.

Challenging environment – challenging moves
Planning a blend of skills to solve the problem that require different tactics in the trial and error phase.

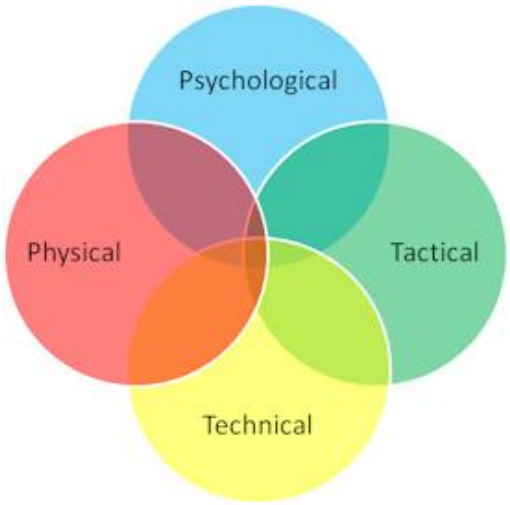
Use of features to create problems to solve
Recently while working with canoes and looking for a suitable challenge for boat control we used a pier. The environment was benign, but we needed to test boat control and ensure the students had ways to turn, accelerate forwards and move left and right. This ability to use random practice to challenge boat handling skills aided the student in their planning of tactics, stroke choice and paddling side. The blend of skills using the pier gave immediate feedback on the appropriateness of the selection made along with the opportunity to go again and find another, or a different option gives great learning.

Summary
What type of practices do you do with your students? Why do you choose one type over the other?
Is it structured?
Do you have plan?

By asking yourselves these questions, your practice will be more focused and thus you can start to solve those little niggling paddling problems that we all have.
Choose your type depending on what you need to do either by your skill level, the environment that you find yourself in or the problem that you need to solve.

2.7 Paddling Concepts

Paddling performance is related to an interaction of the Technical, Tactical, Psychological and Physiological elements involved in coastal kayaking.



TTPP Model

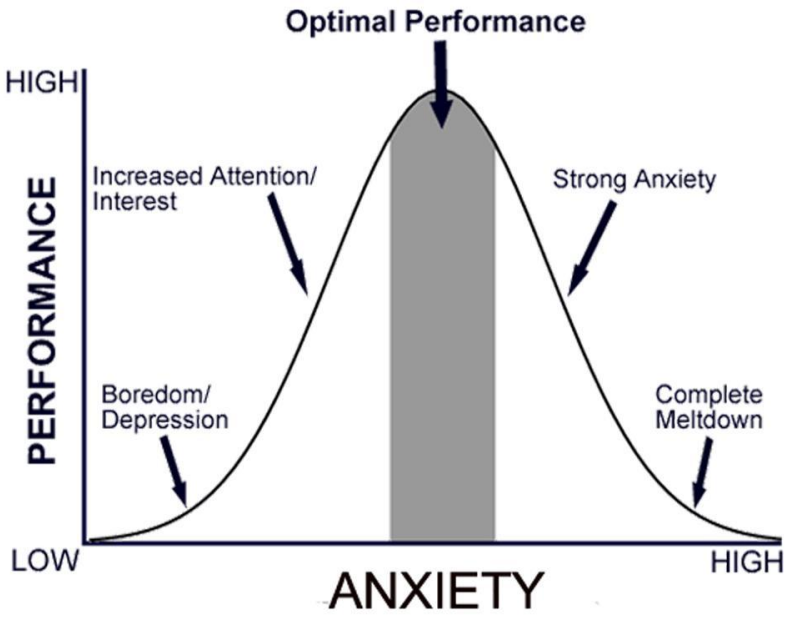
A good example would be a launch through surf:

Psychological – anxiety, fear, exhilaration, ego, peer pressure.
Physical – strength/fitness to power the boat through and over waves.
Technical – effective power stroke and bracing skills.
Tactical – timing between sets, using the rip.

It is sometimes displayed as a pyramid showing the degree of importance or emphasis for each element:

The degree of importance might change depending upon the activity.

The **psychological** element within coastal kayaking can be easy to overlook.



Fear is a huge barrier to learning and an effective instructor must be looking for signs of fear in their students, such as a tight grip on the paddle, loss of peripheral vision, jerky technique and lack of response to verbal commands.

Likewise, if you fail to provide enough challenge for more able students, their performance will likely suffer.

The **physiological** element in coastal kayaking may not be as important as in other more physically demanding pursuits, and that is often why mature people are attracted to the sport. But as they progress into more challenging conditions, a lack of flexibility, a lack of strength or lack of endurance may limit their performance.

The **tactical** element in coastal kayaking can compensate for other weaknesses. A smart strategy can help a student overcome a challenge, even if they are lacking physiologically.

Rightly or wrongly, the **technical** element is what we as instructors tend to focus on the most with our students. Good technique will compensate for lack of strength. Women tend to be better technical paddlers than men, using good technique to compensate for less strength.

We are not in the business of creating clones. There is no ACA or BCU way of doing anything. There are more efficient ways to do things and less safe ways to do things. But we must always work with what we have and adjust as necessary.

Six Degrees of Freedom

Acknowledgment to Steve Scherrer

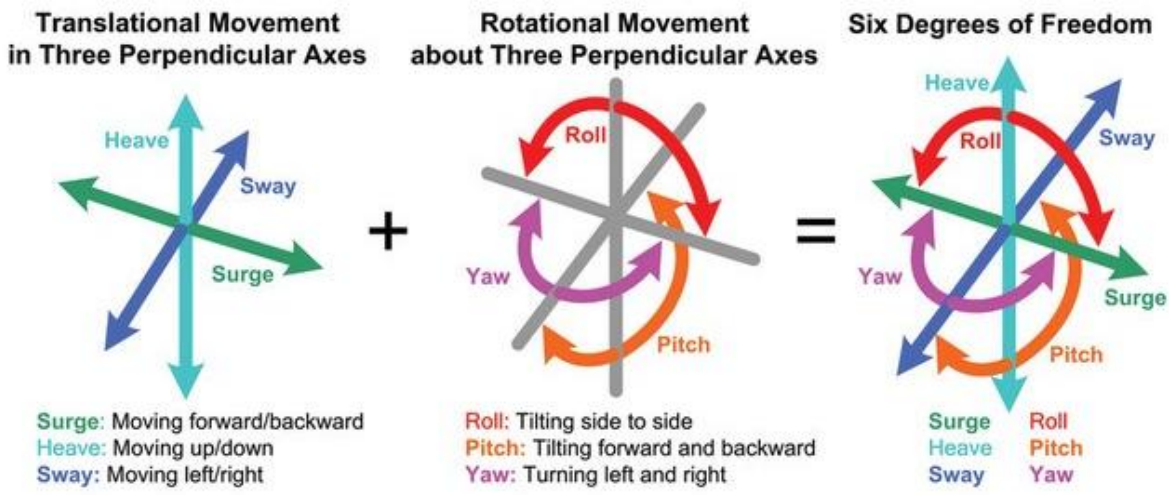
The motion of a kayak at sea has the six degrees of freedom of a rigid body, and is described as:

Translation:

1. Moving up and down (heaving);
2. Moving left and right (swaying);
3. Moving forward and backward (surging);

Rotation

1. Tilts forward and backward (pitching);
2. Swivels left and right (yawing);
3. Pivots side to side (rolling).



Understanding how our kayak moves and how we can influence how it moves will help us become better paddlers. It is also an effective way to introduce paddling concepts.

TEACHING TIP:
Use a model of a sea kayak, paddler (with paddle) or better still carve one out of wood or minicell foam to show the six degrees of freedom and how we use our body, boat and blade to

effect change. Those visual learners will love it and watch for smiles and light bulbs going off in the brains of the theorists in your group!

PADDLING FOUNDATIONS

Robin Pope (**Level 5 River Kayak and Safety & Rescue ITE)**

Whether you're paddling a sit-on-top on flat water, a sea kayak offshore, or a play boat in a hole, effective paddlers all draw upon the same basic skill set. Effective instructors need to understand not only how to perform these foundational skills, but also how to communicate them to students.

Below is one way of looking at these foundational skills with explanations of how they relate to paddling and paddling instruction. There are other ways to think about these skills and other ways to teach them. Find what works best for you.

***Comfort*:** Comfort may be the most important thing an instructor can provide. Physical comfort comes from taking the time to ensure students are properly dressed, their boats are properly outfitted and fitted to them. Cold students in poorly fitted boats are unlikely to learn much and unlikely to stay with the sport. Good equipment, properly fitted to the paddler, can make the difference between a great day and a miserable day. Physical comfort also means taking adequate breaks for food, water, rest and stretching. Expect beginning paddlers to become sore and tired quickly. Experienced boaters might choose to sacrifice comfort, but that is a conscious, informed choice. New boaters who sacrifice comfort are unlikely to stick with the sport long enough to make an informed decision.

Emotional comfort is just as important as physical comfort. New boaters need time to get comfortable wearing silly looking paddling gear, getting water splashed in their face and hanging out upside down in their boat. Even experienced boaters get scared when they face a significant challenge. Instructors can improve emotional comfort by continuously assessing their students' comfort level, taking time to ease into new skills, listening to student feedback and maintaining an encouraging and supportive "challenge by choice" attitude.

***Posture*:** Good posture leads to good paddling. Paddlers should sit upright with their spine in a relaxed neutral position, with possibly a slight arch slightly forward. Weight should be slightly in front of the ischial crests (the "butt bones"). The spine should have an upright "S" shape, not a slumped "C" shape. Some people find it helps to imagine their head is being lifted-up by a

string, lengthening the spine. Most people have less than optimal posture, so good paddling posture is sometimes difficult and hard to maintain.

Proper posture has several benefits. First, it allows better visibility because it lifts the eyes higher. Second, it allows better breathing by opening the chest. Third, it places the shoulder and back muscles into optimal position for paddling. Fourth, it allows better balance. Finally, good posture generally makes people feel more confident and thus gives a psychological boost.

***Balance*:** Balance helps keeps paddlers in an oxygen rich environment. It is hard to paddle when you're upside down! Good balance comes from good posture. Keep the pelvis and low back loose so that the head stays over the centerline of the boat. Once paddlers master maintaining good balance, they can start playing with deliberately putting themselves off balance to drive play moves (e.g., cartwheels). A great extension of the loose pelvis and low back, required for good balance, is that it allows greater range of motion in the low back. This allows improved visibility, turning strokes and boat control.

***Strong shoulder position*:** Often referred to as "staying in the box" or "staying in the cube", this means that paddlers want to keep their shoulders in the strongest position possible. Shoulders are the most mobile joint in the body and are the most mobile point between the paddle and the boat. As such, they are easily injured while paddling. To reduce the risk of injury and to maximize paddling efficiency, paddlers generally should keep their elbows low (at or below shoulder height), bent and in front of the plane of the body. Elbows can be sharply bent, or almost fully extended, but maintaining some degree of bend allows them to act as a shock absorber, protecting both the elbow and the shoulder. Some people find it easiest to think of a box created by their hands moving with the above restrictions. Others find it easier to just keep the elbows in front of the shoulders. In either case, the shoulders stay protected and the arms are in an effective paddling position.

***Anchor*:** To paddle efficiently, all the energy applied to the paddle should make the boat go where the paddler wants. For this to happen, a few things must be anchored into place. First, the paddler needs to be well anchored in their boat. Good outfitting helps with this, as does consciously pushing with the feet, legs and buttocks during the power phase of a stroke. Second, the paddle needs to be well anchored to the paddler. A solid grip and a strong-arm position help transmit the paddle's power to the boat. Finally, the paddle needs to be anchored into the water, so it doesn't slip when power is applied to it.

Paddles can be anchored to water in two ways. First, they can directly push against the water, just like your feet push against the ground when you walk. Second, the paddle can be used to generate lift like an airplane wing. In both cases, the goal is to ensure the paddle (the anchor) doesn't slip. If the paddle moves too fast, water can't "push" against it effectively. In many

cases, bubbles will be generated around the paddle – a phenomenon known as cavitation. Cavitation is a clear sign the paddle isn't anchoring effectively. It can be corrected by slowing the paddle and ensuring it is fully submerged.

Focus**:** At its simplest level, focus simply means look where you're going. However, this simple act has some powerful consequences. First, you can see where you're going, which is generally a good thing. Second, keeping the head up and looking toward your destination helps to improve posture. Finally, it tends to set up appropriate torso rotation and boat edging when turning, which makes it easier to get where you're going.

At the next level, focus means paddling proactively. Good paddlers look ahead, plan their route and use as few strokes as possible. They also appropriately plan their day (which might mean a detailed rapid-by-rapid plan or might just mean "I'm doing an Ocoee play day."). This approach lets them avoid bad spots, while hitting fun spots with as much energy as possible and makes the day a lot more fun.

At its highest level, focus means determination. Focused paddlers are determined to get where they need to go. If they hit a rock, miss a stroke, or catch an edge they still maintain that mental and visual focus and accomplish their plan. Determination also means putting in the necessary practice time and finally, means being able to maintain focus when things don't go as planned.

Timing**:** When paddlers first learn, they practice even timing of their strokes, so they develop a good paddling rhythm. As paddlers become more experienced, they learn to change that rhythm to take advantage of water features. For example, a stroke might be sped up to gain momentum or delayed so it is placed inside an eddy. Appropriately timed stroke placement makes strokes much more effective.

Symmetry**:** Most paddlers find it easier to do things on one side of the body. However, good paddlers work to develop their skills on both sides so there is no "on-side" or "off-side". Being able to paddle equally well on both sides means a paddler can handle whatever comes their way.

KAYAKING STROKES: KEY COMPONENTS

This is perhaps the most controversial topic in this manual since it is prone to personal bias, opinion and preference. But at the very least it may form the basis for discussion!

Good kayaking technique is built on the efficient and skillful execution of paddle strokes. Your initial success as an instructor is largely a matter of teaching these strokes effectively and giving your students clear feedback.

Keep in mind that these are "pure" strokes, with the focus on maximum efficiency. Strokes may be altered according to conditions, when incorporating a brace (support) component, and when linking strokes. Technique may alter if using a 'traditional' paddle or wing paddle rather than a 'Euro' paddle. Body type and physical limitations will affect performance and it is critical to be realistic and honest with your expectations and sensitive in the feedback you provide.

Generic Concepts to Consider

- Paddler's Box - are the arms and shoulders safe?
- Edging is achieved by weighting the sit bone (NOT lifting the knee).
- Control of the blade face with the elbow (NOT the wrist).
- Imagine a 'Force Arrow' perpendicular to back of blade.
- What are the 'drivers' for the stroke - where does the power come from?
- When teaching these strokes, we typically work on no more than three components at a time.

Several key components for each stroke are listed below, including the most common errors that beginners make. When giving feedback, deal with each point separately. Don't overwhelm your students. Also, be sure to pay attention to these components when demonstrating or modeling the strokes; you might spotlight a component or even exaggerate a bit to make your point (i.e. rotate your torso in an exaggerated fashion when setting up for the draw stroke).

Forward Stroke:

1) SET UP phase: Positive torso rotation, wind up for the catch with both blades out of the water, body upright, pelvis tilted slightly forward, rotation all the way through sit bones, upper hand around eye level, upper elbow below wrist and shoulder.
2) CATCH phase: BOTH arms extended (elbows relaxed not locked), blade enters the water well forward, close to boat, blade perpendicular to direction of travel, blade fully immersed BEFORE torso unwinds, relaxed grip, both wrists aligned with forearms.
3) POWER phase: paddle shaft well away from torso during power phase to aid in torso rotation, drive with the foot on the same side as the working blade to transfer power from

blade to boat, rotation through neutral, upper hand remains at eye level, both arms remain extended (not locked).

4) RECOVERY phase: Exit begins at knee (torso rotation neutral), completed by hip.

<u>Most common problems</u>: Stroke too long; all arms, no torso- watch for trailing blade lifting water on release, bent arms, cocked wrists, top hand dropping during power phase.

TEACHING TIP: use the 'Tapping Drill' - tapping on the opposite side of the kayak with the power face of the blade before placing the blade in the water on the 'normal' side – encourages torso rotation and slows the stroke down, making each stroke more deliberate. It is difficult to work on technique when paddling at normal speed.

Reverse Stroke:
Method A (MAXIMUM POWER)

1) SET UP phase: Positive torso rotation through sit bones – toward stern looking in direction of travel, upright posture, paddle shaft horizontal.
2) CATCH phase: blade enters close to boat, near stern, with back of blade flat to water surface.
3) POWER phase: drive paddle deep, close to boat throughout stroke, top hand rises to eye level.
4) RECOVERY phase: release at feet with good follow-through.

Method B (MAXIMUM CONTROL)

1) SET UP phase: same as for maximum power.
2) CATCH phase: back of blade face flat on water, approx. 45 degrees off keel line (will require that you edge boat), BOTH arms extended (elbows relaxed not locked)
3) POWER phase: unwind torso while rotating wrist up & forward to keep back face loaded, with climbing angle – same as reverse sweep
4) RECOVERY phase: release towards feet - to correct heading, hold edge longer and finish stroke further toward the bow.

<u>Most common problems</u>: Leaning back, not looking in direction of travel during set up phase, blade not flat on entry.

TEACHING TIP: paddle in a conga line, playing red light, green light – red light = paddling backwards, green light paddling forwards.

Forward Sweep Stroke:

1) SET UP phase: Positive torso rotation, wind up for the catch with both blades out of the water, body upright, pelvis tilted slightly forward, rotation all the way through sit bones, upper hand around chest level, upper elbow below wrist and shoulder.
2) CATCH phase: lower arm extended (elbow relaxed not locked), upper arm slightly bent, blade enters the water well forward, close to boat, vertical blade face more efficient, climbing angle for more support, fully immersed BEFORE torso unwinds, relaxed grip, both wrists aligned with forearms.
3) POWER phase: extension – sweep paddle well out away from boat, horizontal shaft – keep non-working blade hand low (aids extension), edge towards working blade, look in direction of turn, push with same side foot (push boat away from blade), move the boat not water (minimal bubbles).
4) RELEASE phase: finish near stern, close to boat for maximum turning effect.

   <u>Most common problems</u>: Leaning forward, not enough extension, paddle sweeps too close to boat, eyes following paddle blade not looking in direction of turn.

TEACHING TIP: have students work in groups of three, form a letter "H" with their kayaks with their kayaks with the kayaks at each end of the "H" facing in opposite directions. The challenge is for the paddlers at each end to chase each other using forwards sweep strokes (only). The paddler in the middle is the referee and can give feedback.

Reverse Sweep Stroke:

1) SET UP phase: positive torso rotation through sit bones – toward stern looking in direction of travel, upright posture, paddle shaft horizontal.
2) CATCH phase: BOTH arms extended (elbows relaxed not locked), vertical blade more efficient, flatter blade for more support, blade fully immersed, near stern, close to boat, BEFORE torso unwinds, relaxed grip, both wrists aligned with forearms.
3) POWER phase: extension – sweep paddle well out away from boat, vertical blade face more efficient, climbing angle for more support, hook boat towards working blade with opposite knee (abdominal crunch), horizontal shaft – keep non-working blade hand low (aids extension), edge towards working blade, move the boat not water (minimal bubbles), look in direction of turn.
4) RECOVERY phase: release near bow, close to boat for maximum turning effect.

   <u>Most common problems</u>: Leaning back, not enough extension; paddle sweeps too close to boat.

TEACHING TIP: use balls or rubber ducks to help students focus on where they are going rather than what their blade is doing.

Standard Draw Stroke:

1) SET UP phase: torso rotation (face direction of travel), paddle shaft near vertical, top hand at eye level.
2) CATCH phase: blade fully immersed, perpendicular to direction of travel.
3) POWER phase: steady upper hand – functions as a pivot point, edge towards (more power) or away from (more stability) working blade to improve efficiency, move the boat not water (minimize bubbles).
4) RECOVERY phase: slice blade back to catch position well before it reaches boat to avoid tripping over blade.

   <u>Most common problem</u>: Not enough torso rotation – boat turns instead of going sideways, upper hand unsteady diminishing fulcrum effect.

Low Brace:

1) SET UP phase: elbows up, above paddle shaft, power face up, paddle shaft and back of working blade horizontal, edge, then lean to tip boat off balance.
2) POWER phase: push back of blade deep down into water – create 'depth charge', simultaneously hip snap by throwing weight from working side hip to the other hip.
3) RECOVERY phase: drop elbow to slice blade forward and up out of water.

   <u>Most common problem</u>: Lack of coordination between hip snap and blade slap.

High Brace:

1) SET UP phase: elbows in: below paddle shaft, close to body; paddle shaft well below chin, power face down, paddle shaft and power face of working blade horizontal, edge, then lean to tip boat off balance.
2) POWER phase: drop weight onto power face of blade 'slapping' the water surface, keep paddle shaft horizontal – don't push up with non-working blade, simultaneously hip snap by throwing weight from working side hip to the other hip.
3) RECOVERY phase: slice blade back and straight up by lifting elbow for recovery.

   <u>Most common problems</u>: Lack of coordination between hip snap and blade slap, non-working hand punches up.

TEACHING TIP: teach the braces in shallow water, standing in the water next to the student (in his/her boat) where you can hold onto deck lines to give support and direct feedback.

Low Brace Turn:

1) Establish hull speed!
2) INITIATE: initiate turn with an effective forward sweep stroke.
3) SET UP: Low Brace position on side you want to turn towards – elbows high.
4) BLADE ANGLE: climbing angle to back of blade – power face up.
5) EDGE: into turn or away from turn (inside or outside edge), inside edge is more stable but means you need to switch edge from sweep stroke side.
6) You need speed to make this stroke effective – should turn you 90 degrees.
7) RECOVERY: slice blade forward ready for next Forward Stroke.

Most common problems: Lack of initiation with effective sweep, insufficient edge.

High Brace Turn:

1) Establish hull speed! You need speed to make this stroke effective – should turn you 90 degrees.
2) INITIATE: Initiate turn with an effective forward sweep stroke.
3) SET UP: High Brace position on side you want to turn towards – elbows tight to side.
4) BLADE ANGLE: slightly open (climbing) angle to power face of blade – power face down.
5) EDGE: into turn or away from turn (inside or outside edge), inside edge is more stable but means you need to switch edge from sweep stroke side.
6) RECOVERY: Slice blade forward ready for next Forward Stroke.
7) More torque on body than Low Brace Turn – more suited to shorter kayaks.

Most common problems: Lack of initiation with effective sweep, insufficient edge, high elbows, risk of shoulder injury.

Bow Rudder:

1) Establish hull speed! You need speed to make this stroke effective – should turn you 90 degrees.
2) INITIATE: Initiate turn with an effective forward sweep stroke.
3) SET UP: Blade is FULLY IMMERSED between knees and feet on side you want to turn towards, lower arm elbow bent, paddle shaft near vertical – top hand in front of forehead.
4) BLADE ANGLE: Open power face of blade progressively – then close it down as you lose speed.
5) EDGE: into turn or away from turn (inside or outside edge), outside edge – slow speed turn (sea kayak); inside edge – fast turn (whitewater kayak).
6) RECOVERY: Slice blade forward ready for next Forward Stroke.

Most common problems: Lack of initiation with effective sweep, insufficient edge, blade not fully immersed, over-reaching.

TEACHING TIP: stand in the water next to your student. Help them achieve the correct position and then give them a push to allow them to feel the effect of the stroke and achieve early success.

Stern Rudder:

1) Establish hull speed!
2) SET UP: torso rotation – if you drop the paddle it should land in the water, paddle shaft should be parallel to center line of kayak, blade FULLY IMMERSED with blade vertical for NEUTRAL position.
3) BLADE ANGLE: PRY: roll wrist to load pressure on backside of blade.
4) EDGE: edge away from direction of turn and away from paddle – BOTTOM to BOTTOM (bottom of the blade to the bottom of the boat) – most powerful!
5) BLADE ANGLE: DRAW: roll the wrist to load pressure on the power face of the blade.
6) EDGE: edge away from direction of turn and towards the paddle – TOP to TOP (top of the paddle to the top of the boat) – less powerful than pry.
7) Front Hand Height: Front hand will pull during the PRY and push during the DRAW and should be at chest height or lower.
8) Power is generated from the torso by maintaining Paddler's Box and driving the working blade deeper.
9) RECOVERY: Slice blade forward ready for next Forward Stroke.

<u>Most common problems</u>: Top hand pulled in causing a braking stroke, rather than parallel for rudder, not enough torso rotation, blade not fully immersed.

TEACHING TIP: have your students tow each other using a long tow. This will allow them to have enough boat speed to practice the stern rudder and see and feel the effect of both the pry and the draw.

Side Slip:

1) Establish hull speed! Take last stroke on same side as Side Slip.
2) SET UP: torso rotation – in the direction you want to go, paddle shaft should be near vertical and in similar position to standard draw stroke. This is a static stroke, i.e. paddle blade does not move relative to boat.
3) BLADE ANGLE: Start with working blade in neutral position, slicing through the water, gradually open power face to direction of travel, until sideways movement is generated. Close down power face as you lose speed. 'Dial it up; dial it down'.
4) EDGE: edge towards (more powerful) or away (more stable) working blade.
5) Straight Line: Boat should move forwards and sideways. If boat turns adjust position of working blade towards the bow or stern to find 'sweet spot'
6) If boat turns adjust position of blade relative to boat

7) Maintain Speed: There should be minimal loss of speed if the stroke is performed correctly
8) RECOVERY: Slice blade forward ready for next Forward Stroke.
9) To perform Side Slip whilst travelling backwards, perform the same stroke, opening power face towards direction of travel

   Most common problem: Paddle placed in the water too far forward causing the boat to turn towards working blade.

TEACHING TIP: like the bow rudder, stand in the water next to your student. Help them achieve the correct position and then give them a push to allow them to feel the effect of the stroke and achieve early success.

Kayak Roll:

1) There are many types of Kayak Roll. The technique described is for a sweep roll with a 'Euro' blade.
2) SET UP position: Normal grip on paddle shaft, torso rotated, paddle along one side of kayak, middle of paddle shaft in line with mid-line of hip, body and nose, power face of working blade facing up.
3) Remain in Set-Up position. Capsize towards paddle and allow kayak to settle fully upside down. Look towards your paddle and the surface.
4) Push both hands out of water ensuring working blade breaks free from water
5) Unwind torso, until paddle is at 90 degrees to center line of kayak, using a climbing angle for working blade to keep it on the surface
6) AT THE SAME TIME, place non-working blade under your butt
7) JUST BEFORE the paddle reaches 90 degrees and working blade is at furthest point away from body, hip snap, lifting with the knee on the same side as the working blade and throwing weight from hip on working side to non-working side
8) The hip snap should be explosive!
9) Leave the head in the water for as long as possible and look towards working blade.
10) Resist the temptation to punch up with the non-working hand. This will cause the working blade to dive. You should finish upright, in the same position as at the conclusion of a High Brace.

    Most common problem: Lifting the head too early.

TEACHING TIP: a dive mask or swim goggles and nose plug combined with ear plugs will greatly enhance the comfort level of your students in the early phases of learning to roll. A skull cap is a good idea if the water is less than body temperature.

Discussion on Edging & Fit

Edging is a fundamental skill in coastal kayaking. It can take a while for a student to feel confident and comfortable on edge. Edging is used to tighten a turn, when crossing eddylines and when side surfing a wave.

It is well worth spending considerable time in a skills development class on edging.

BC Level 5 Coach Nick Cunliffe suggests that there are several points to consider when introducing the concept:

- Whether to weight the sit bone or lift the knee
- Different postures in different moments, different connections in different situations
- Contact (seat / hips / thighs / knees / feet) - all or nothing? Binary choice? Or analogue options?
- Pressure - if contact exists, where? If so, how much pressure? Optimum amounts for different situations?
- Less pressure / more pressure? Pros / cons?
- Back bands / seats / thigh braces / footrest design - many variables
- Flexibility / mobility / core strength - everyone's different
- Different kayaks (volume / design / outfitting), different people (size / weight / mobility), different waters (smooth / rough, in all its forms)
- Lateral weight shifts into seat corners, fore / aft weight shifts, body rotation toward / away from direction of boat tilt / turn
- Static / on the move / straight line / turning
- Inside edge / outside edge turns, into / away from wind / waves / current
- Lots of options for every paddler - perhaps exploring alternatives, converging towards personal solutions for specific situations?
- If we put the student first, we'll find answers that fit

"What works for me? - a compromise that allows free movement of my legs, with the ability to engage / apply pressure as needed. I'm looking to extend the range of conditions in which my contact / pressure can remain light, for freedom of movement and relaxation advantages. In dynamic water where the energy of the wave will move my kayak around, I increase pressure as needed, for the advantage of balance / responsiveness - at the expense of other performance elements. This is particularly true for me when turning my boat in dynamic water. I like a fit that allows some lateral weight shift - for similar reasons as described above. I may move the foot pegs slightly during a paddling session, to increase / reduce contact / pressure, according to aims / conditions. All personal to me, transferable to other paddlers.

I've been experimenting with coaching an awareness of contact & pressure as two different dimensions of the overall sense of 'fit'. Physical changes (foot pegs) and psychological changes

(anxiety) can increase contact point pressure inside the boat beyond optimal levels, in my experience. Reducing pressure while maintaining contact when necessary has been a successful strategy with many students."

ACA L5 ITE Ryan Rushton says:

"I've been working students through a series of exercises to see what works for them and to encourage thinking beyond their current perceptions.

I have them start with paddle across the deck, sitting in a neutral posture, and encourage them to edge by either weighting the onside sit bone or applying pressure into the offside thigh brace. I ask them edge to the greatest degree they feel comfortable, using either/or and then using both. I have them ask themselves (or share) what makes them feel more relaxed, stable, able to rotate, etc.

Next, I have them rotate so the paddle / their shoulders are parallel to the boat and have them repeat the exercise seeing if they notice any difference, probing with similar questions as before. If they're all feeling comfortable, I'll have them rotate quickly back and forth, paddle quickly moving from parallel on one side, to parallel on the other side (usually introducing or emphasizing the concept of the head leading the way on rotation).

If they're really looking comfortable, I'll challenge them to transition from edge-to-edge while they rotate/swing the paddle from side to side. Throughout the exercise I'll ask them to visualize a gymnast sticking the landing on a dismount. I've found this visualization helpful when challenging them to stick the landing while transitioning from one edge to the other - "without bobble".

Depending on the students/environment/course structure, I'll extend the exercise while under way, or ask them to think about these things while surfing or playing.

I've found that most students perceive greater comfort or ability to rotate while edging with the sit bone but can edge to a higher degree when using both. I find this also true of myself. If edging while underway or in moderate conditions, a greater percentage of my edging is done with lower boat pressure. As I look to carve a turn, etc. more pressure goes into the thigh brace, foot pedal and back band."

When contemplating the body mechanics of how we edge consider a sit-on-top kayak, surf ski, wave ski or ICF racing kayak. None of these kayaks have thigh braces yet it is perfectly possible and often necessary to edge the kayak to accentuate a turn by shifting weight from hip to hip or sit bone to sit bone.

2.8 Teaching Rescues

THE THREE LEVELS OF "CAPSIZE-ANXIETY"(AND HOW TO DEFUSE THEM)

Kenny Howell, ACA L5 Instructor

We have all seen a condition I call “capsize-anxiety” and our job as instructors is to defuse it as much as possible **before** the student becomes totally gripped with terror and makes a mess of the wet-exit. Shoulders have been dislocated, believe it or not, during wet-exits; I am convinced this happened in part because the students had capsize anxiety of one form or another.

Below I describe how to defuse capsize anxiety for your students. **Remember, if they don’t do the rescues, it’s not a “failure” on their part; they need to learn rescues for their own safety, to rent kayaks, and to participate in other kayak classes and trips, etc.** Therefore, you should give it your best shot to encourage them to do a wet exit and try a rescue. Otherwise they are not getting the full benefit of the class.

LEVEL 1:

The fear of capsizing and getting trapped upside down in a kayak is nearly universal among beginners. Most students will have some anxiety about capsizing but are not necessarily “gripped with fear” about it. Be sure to help defuse such anxiety by pointing out that **no one will get trapped in their kayak and it is EASY to get out**. Then proceed with normal wet-exit instruction; show set-up position for wet exit; emphasize Tuck, Pull & Push concept before launching, in case of capsize.

LEVEL 2:

When rescue drills begin, some students are hesitant to participate. Answer their questions, review technique and encourage the wet exit. Explain it is part of learning to kayak and is no big deal; if they want to go on trips or rent decked sea kayaks, this is required training. Have them splash water on their face to diminish the shock of the cold water, place one hand on the grab-loop of skirt before tipping, bring knees together, etc. Some instructors talk about hanging in the boat (underwater) momentarily, counting to three (optional!). Just give positive encouragement - don’t be too pushy.

LEVEL 3:

If a student is struggling with the class in any way, take this as a red flag to watch carefully when it is their turn to capsize. Some students make it very clear they are not going to capsize, no way (this seems to be rare, but it does happen). Maybe they are just taking the class with a friend and have no real interest in learning to kayak. Once you make it clear that this is part of the class, you have done your job! However, if you sense that they might be up for a “reduced-fear” method, use tricks like pulling the skirt off

first, or in extreme cases, legs out of the cockpit. If they do not actually tip over, but do the rescue - be sure to write "**No wet-exit during rescues"** on the Completion Card.

Note on Level 3 student: In a private lesson, you can take the time with a challenging student to wet-exit with the instructor standing by in the water right next to the student - like in a rolling class. Explain how you can right them with your hands, and they cannot be trapped in the boat (this can be demonstrated with another instructor or friend, if possible). Use this hands-on method in preference to the "Eskimo Bow Rescue," which might be too scary for level 3 students.

RESCUES: KEY COMPONENTS

Key Points for T-Rescue:

1) After the wet exit the swimmer needs to hold onto their boat and paddle. Flipping the boat upright makes it easier swim with, especially in current, and easier for the rescuer to grab and haul up but it is more susceptible to the wind.
2) The swimmer should be ACTIVE IN THEIR OWN RESCUE by finding their bow and actively swimming towards safety.
3) The rescuer needs to get to the bow of the empty boat and hold on with both hands (the swimmer can transfer to the rescuers where it is easier to communicate and keep track of them).
4) The empty boat needs to be pulled up the rescuer's boat to drain any water. An upright boat is easier to drag up on your own and will fall to one side at which point most of the water will drain out. Flip the boat upside down using the deck rigging for leverage to get the last remaining water out of the boat. An upside down is harder to drag up, but the boat will drain automatically as it is brought up. Angling the boat a little to break the vacuum in the cockpit will make it easier to lift initially.
5) The boats should ideally end up bow to stern but don't waste time reorienting them if they end up facing the same way. The rescuer must lean onto the empty boat and use both hands to stabilize it. The rescuer can grab the cockpit coaming - it's always there - or the deck lines - if they exist - which are more out of the way during the re-entry.
6) The swimmer needs to get onto the back deck of their boat, belly down, facing the stern. The swimmer can give their paddle to the rescuer, making it easier to get up, or they can hold onto it to make sure they do not lose it. They can 'swim' up like a seal - simpler - or they can use the heel hook which is easier for most swimmers but puts more torque on the rescuer. Another option is the step ladder approach, climbing onto the rescuers boat which is lower in the water than their empty boat, and then transferring to their boat. This also places less torque on the rescuers body.

7) The swimmer stays low on their belly, slides their feet and legs into the cockpit then rotates towards their rescuer into an upright, seated position.
8) The rescuer should hold onto the kayak while the swimmer adjusts things like the back band and reattached the spray skirt.
9) Check the well-being of the swimmer. What caused the capsize in the first place? Are they ready to paddle without support or do they need a rafted tow?

The T-rescue is the primary assisted rescue, at least with a lightly loaded kayak. With a heavily loaded kayak and heavy tandem kayaks, you can forgo lifting and emptying the water by using a side-by-side rescue & pump-out method instead. This is the same as the T-rescue, except you don't dump the water first. This takes longer than the T-rescue but may be easier than trying to lift a loaded kayak. If also gets the swimmer out of the water more quickly.

Key Points for Paddle-Float Self-Rescue:

1) Try to hang onto paddle and kayak when bailing out. This is very important in windy conditions; you may not be able to catch it by swimming.
2) Keep the boat upside down, initially. Lie back with one leg in cockpit while inflating paddle-float. Relax! Putting the paddle-float on the blade that you are most comfortable bracing on will help once you are back in the boat.
3) Consider whether you wish to expend time and energy attempting to lift the bow of your kayak to get some of the water out as you flip it upright. This will save time and effort later with less pumping to do, but lifting the bow of the kayak requires strength, long arms, good floatation, and there is a risk that you will let go of the kayak as you flip it upright. Tilting the kayak slightly as you lift will help to break the vacuum and make it easier to lift.
4) After righting the kayak, hold the paddle-float "outrigger" perpendicular to the kayak. Another option is to use deck rigging or a strap system to hold the paddle in place behind your cockpit.
5) Hook your ANKLE on the paddle near the float to assist in getting up onto deck.
6) Keep one limb on the paddle shaft throughout the rescue. Step one leg into the cockpit; then reach to the paddle with one hand; then the second leg into the cockpit; then the other hand to the shaft as you rotate towards the outrigger and into your seat.
7) Stay low the whole time; "hug" the kayak.
8) In rough water, replace the spray-skirt, then slide pump in along one side to pump water out.

The single most important point for any kind of rescue is to practice it until you can do it efficiently. Start in flat water then move progressively into the type of conditions where a rescue is much more likely to occur.

A good rescue is simple and easy to learn; it must work in rough, windy conditions.

2.9 The Flow Channel

Article by British Canoeing Coach, Zoe Newsam, first published in the Autumn 2019 issue of Scottish Paddler, the Scottish Canoe Association magazine.

Flow? What's Flow? We do it for fun, surely? Whether you're a competitive athlete or a weekend warrior, whether you paddle every day or once a year, paddlesports, by their very nature, must be fun to motivate us to take part in them. But what does that mean? What is it that makes it fun?

For me, it goes something like this...

The wave passes under my boat like molten glass, with no sound, no fury, just pure unadulterated beauty. Time stands still. My mind is empty of anything other than here and now. There is nothing, just me, my boat and this wave, working in harmony, as if they're connected somehow. I turn my head, and in that moment my boat does as I ask, with no effort. It's a feeling of pure ecstasy, ultimate control...

It can last mere seconds, or hours, but in those moments, I have no worries, no fears, no space in my brain for anything other than the moment I am in. It feels like floating, or like effortless gliding, as though everything I've ever worked for has come together in that moment.

For me, that is the purest definition of fun. Does it happen every time I paddle? No, it most certainly doesn't. Does it happen in other areas of my life? Yes, it certainly does!

So, what is 'flow'?

Psychologist Dr Mihaly Csikszentmihalyi, building on the studies of Abraham Maslow before him, researched the concept of flow following his own profound experiences in a second world war Italian prison camp. He had discovered that by learning to play chess, becoming obsessed with the game, nothing else could enter his thoughts. He was completely immersed: his dire situation forgotten; the presence of prison guards irrelevant. He was experiencing flow.

Csikszentmihalyi has become synonymous with the concept of flow, but the idea has been around for millennia. Whether it's called 'Zen', 'Rapture', 'The Zone' or any other name, it is a phenomenon that humans have sought and used throughout history. For good reason, too. It's an elusive mistress, a drug that we can't pin down. But a drug it most certainly is - flow releases a potent mixture of hormones including dopamine, norepinephrine and endorphins, a group of neurotransmitters which between them make us feel good, respond to challenge or stress, and have a morphine-like effect. No wonder the result is such a high.

I remember being in a math class at school and being given a set of equations to solve. But

instead of finding them difficult, I thrived on the problem, losing myself in the challenge, so that time disappeared. You might think a math class a peculiar environment for this to happen, but flow is all around us, at work, in conversation. Ever lost a whole evening deep in conversation with a friend? That's flow in action.

Not long after I started paddling, I remember watching Justine Curgenven's film 'This is the Sea 3'. It featured a few minutes filmed in Scottish Tide Races and showed a group of paddlers at the Falls of Lora. Towards the end of the piece, a paddler [Nick Cunliffe] crosses the powerful eddyline with power and grace and surfs the glassy green wave with effortless precision. It was one of the most beautiful things I'd ever seen - a paddler deep in the zone, absolutely immersed in the moment and totally in control, the challenge perfectly matched to the skill he'd worked so hard to achieve. Watching that moment remains with me to this day as a source of inspiration.

Nick Cunliffe, main wave, Falls of Lora.

So how can we access Flow? If it feels so good, is it possible to make it happen more often? Well, yes, it is. Accessing flow takes a very particular set of conditions. But the good news is that the more you paddle, the better you get, and the more likely you are to be able to find this elusive state – but only if you challenge yourself. I've paraphrased the conditions a little to make them relevant for paddlesports:

- ***External triggers*:** No distractions, no interruptions. The qualities of an environment that drive people deeper into the zone such as risk: the task demands full concentration; consequences will punish distraction. Nothing must interrupt the zone.
- ***Clarity of goals*:** knowing exactly what you need to do. The emphasis here is really on the word 'clarity'. Having an exact, clear goal: perhaps crossing above a drop, getting onto a wave, making a move; these allow us to perform in-the-moment, focusing only on what we want to achieve, right there and then. Immersion.
- ***Matching challenge to ability*:** If the challenge is too little or too much, we cannot achieve flow: it only happens when there is a perfect match, when we feel challenged by just the right amount.
- ***Immediate feedback*:** The human body is covered in sensory receptors: we receive feedback constantly, and paddlesports give us the perfect environment to receive this feedback. Listen to what your body, boat and blade are telling you, and allow your body to respond without cognitive thought.
- ***Mastery*:** Flow is, quite simply, the reward for practice and effort. Get good, and you will find flow.

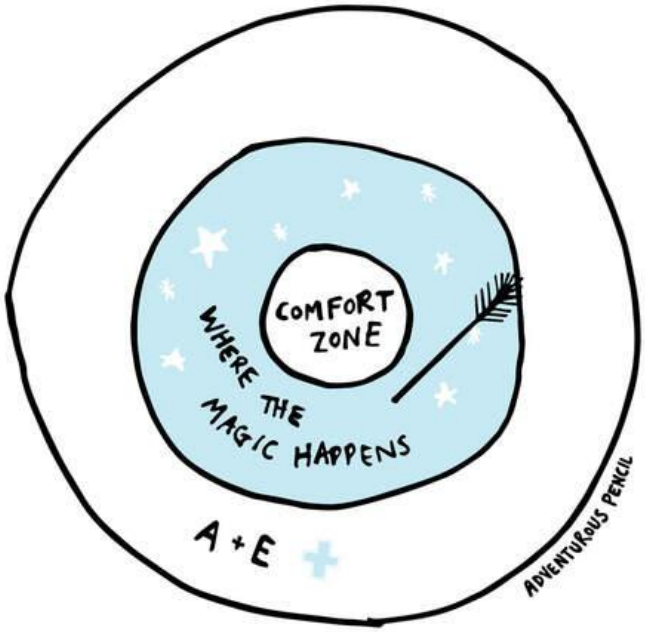


Illustration: Amy Dunis, www.adventurouspencil.com

Is it possible for us, as friends, coaches or leaders, to help others achieve the state? Well, yes, it is. And even better, it's beneficial for learning, too. Learning is long-lasting when it's achieved through feel – and being in flow is all about just that.

So how can you influence these factors, for yourself or others?

- Who do you paddle with? Do you feel judged? Or supported? For me this is one of the most important elements, and the one that really determines whether I am likely to find flow, or not. Can you feed off each other? Group flow is very much a thing and can be extraordinarily powerful.
- How are you setting your level of challenge, either for yourself or for people you coach? Is it only just a tiny bit above what you know you can achieve? If the leap is too big, fear and cognitive thought will get in the way. Too small, and you're not engaged enough: the outside world can invade your thoughts.
- Can you set yourself challenges with specific goals? Try it, next time you head out.

So, what are you waiting for? Get out there and challenge yourself; match the challenge to your ability and let the present melt away. If you are a coach or a leader, experiment with providing an environment where your learners can concentrate fully on the task in hand, with no distractions or interruptions. For a coach this is the challenging part: that means silence.

This article is based on literature, but also on my own ponderings and experiences, on my own learning, paddling and coaching. Get out there and try it for yourself- and then, when our paths cross, tell me what you think… So, what are you waiting for? Head out and Find Flow.

Further Reading:

- *'The Rise of Superman' by Steven Kotler, published in 2015 by Quercus.*
- *TED Talk by Mihalyi Csikszentmihalyi, **https://www.ted.com/talks/mihaly_csikszentmihalyi_on_flow?language=en***
- *'Bounce' by Matthew Syed, published in 2011 by Fourth Estate.*

3. Long Term Paddler Development

THE LTPD FRAMEWORK:

1. **Foundation Paddlesport**

Applicable to anyone starting out in paddlesport.

Three stages:

- FUNdamentals stage – learning to move
- Learning to play sport
- Learning to paddle

Optimal development requires an early start; ideally 5-13 years old. However, principles can be applied and be beneficial to anyone in their first years of paddling whatever the discipline, whatever age.

2. **Recreational Paddlesport**

The aim is to give paddlers opportunity and skills to maximize their enjoyment and satisfaction from the sport to whatever level they desire. It is applicable to paddlers who wish to achieve personal goals, e.g. surf a sea kayak; complete a multi-day journey.

The LTPD model can be used as a goal setting and evaluation tool, helping individuals and coaches identify specific areas that need development in order to reach those personal goals.

3. **Performance Paddlesport**

Applicable to anyone wishing to maximize their potential, either competitive or non-competitive.

Split into three stages:

- Train to train – develop skills and fitness
- Train to perform – learn how to perform under pressure
- Train to excel – producing the goods when it matters

As instructors, we should be applying the principles of LTPD into all our delivery. Where is your student in their learning pathway? The underlying principle is that individual paddlers are given opportunities based on their personal needs.

Reference: British Canoe Union – Coaching Handbook – based on work by Dr Istvan Balyi (Hungarian/Canadian coach)

3.1 Goal Setting & Planning

When working with a student to help them progress towards becoming the best paddler they want to be, we should encourage them to set short-term, medium-term and long-term goals to use as stepping-stones.

The goals should be **SMART**:

S – Specific
M – Measurable
A – Achievable
R – Relevant
T – Time bound

COACH PREPARATION:

- Assess student's Needs and Abilities
- Set Specific Goals
- Identify External Influences
- Plan Achievement Strategies

The goals should be **recorded** and should be **exciting** for the student.

Goals can be categorized as two types:

- Product - Focused on a specific outcome
- Process - Aiming towards a level of performance

Types of Plan

- **Recipe Plans** (example: R&O's Progression)

Pre-worked out solutions that draw on (collective) experience and expertise to come up with a program that includes specific content for each session.

+ve: provides clarity of process, allows for exchange of students, easier to market in commercial context

-ve: takes focus completely away from the individual toward the perceived need of the organization

- **Short-term Plans** (example: Summer Camp)

Periods of up to five sessions; that have at their focus a structure, which allows for meeting of short term needs and elements of a progression from one session to the next.

  - Balance of need for direction and ability to be flexible
  - Measurable sub-steps

- **Episodic Plans** (example: Training for specific competitions throughout a long season)

A plan that deals with individual requirements of a session or weekly program while maintaining the longer-term requirements of the season.

The skill here is to place the immediate session in terms of the bigger picture, to blend desire for quick fixes with long-term skill acquisition.

- **Periodization** (example: Training focused on peaking for a specific competition or series)

A plan with a focus on physical preparation toward an event, centered on the idea that certain types of physical conditioning and skill learning are most effective when planned in phases.

- **Blocked Periodization**

The basic idea of **block periodization** is that each macrocycle is divided up into three distinct mesocycles. A mesocycle is a chunk of the training year that focuses on a specific goal. Concentrated workloads directed towards improving a minimal number of qualities which are split across different training cycles.

REVIEW

Coach and student should:

- Meet regularly
- Identify an Evaluation Scheme
- Provide Support and Encouragement
- Constantly Re-evaluate

COMMON MISTAKES

- Failing to Set Specific Goals
- Setting too many Goals (One at a time)
- Setting Product Goals only (No Process Goals)
- Not Adjusting Achievement Goals

Remember – Success is a Journey!

4. Leadership

As Outdoor Leaders, our goals are participant safety, preservation of the natural environment, and positive outcomes for participants

(Paul Petzoldt - 1984)

Character traits of an effective leader may include:

Positive Attitude	**Organized**	**Competent**	**Knowledgeable**	**Wise**
Anticipates Needs	**Realistic**	**Modest**	**Good-Humored**	**Decisive**
Self-Reflective	**Adaptable**	**Resourceful**	**Good Judgement**	**Experienced**

As Coastal Kayak Instructors we need to exhibit all these character traits, as well as **Environmental Awareness**, **Seamanship** and perhaps the single most important attribute of an effective leader: **Situational Awareness**

At the beginning of a typical day of coaching we should be identifying our students WANTS and NEEDS (these may not always be the same things!)

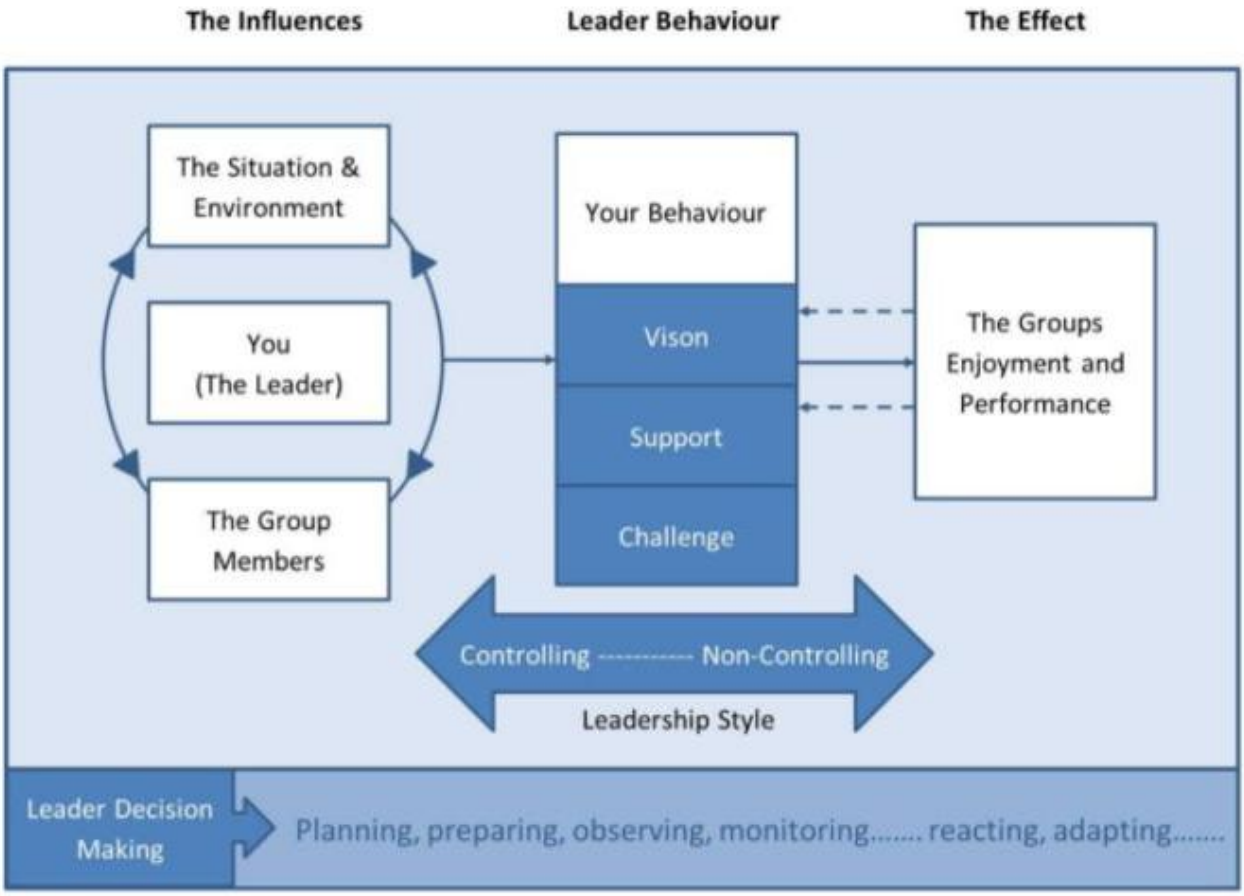
We can then make decisions about WHAT to do and WHERE to go and keep the plan as flexible as possible as those WANTS and NEEDS change throughout the program.

We may offer course descriptions with a defined curriculum or set of goals, but we must always modify what we teach according to the WANTS and NEEDS of our students and the prevailing environmental conditions, and not be confined by the curriculum.

When we are developing independent paddlers and potential leaders, we need to be careful not to give them all the answers. We need to present them with SITUATIONS and OPTIONS. Let them formulate the plan for the day. By giving them the time and space to figure stuff out for themselves, it will enhance their learning, improve retention and promote independence.

Being adaptable in our approach as leaders is crucial both for safety and for the quality of delivery of the program.

BRITISH CANOEING LEADERSHIP MODEL



For an interactive overview of the BC Leadership Model see:

https://www.britishcanoeing.org.uk/e-learning/paddlesport/

Using the Right Style – Situational Leadership

As a coastal kayak instructor, we are tasked to be everything from coach to parent to friend.

The concept of situational leadership considers this diverse need of instructors.

Basically, the idea is that there are better ways to lead and teach depending on your situation. A good leader will find him or herself switching instinctively between styles per the people and work they are dealing with.

For example, new students will need a lot of direction; “put your gear over there, then come back and sit in a circle. Now we’re going to learn about the paddle and how to hold it” is quite different than what you might say to instructor candidates; “Ok, who would like to volunteer to teach how to set up safety for the surf zone?”

To choose the most effective approach for you, you must consider:

- The skill and experience levels of your participants.
- The interpersonal comfort levels within the group
- The environmental hazards
- How much time you have?
- Your own preferred leadership style
- Your comfort with letting out the reigns of control, at what speed and to what degree.

As you begin your own leadership journey, you may initially be anxious about accepting responsibility, then want to retain control. As you become more experienced, you will be comfortable allowing others to lead under your supervision.

Your students will go through the same transformation as they progress from novice paddlers to independent paddlers and group leaders.

Below are a few examples of leadership styles. As we instructors are often on a timeline, I've included the time constraints of each form of leadership on the left.

Less Time to Make a Decision

Directing

The leader makes decisions and informs the group. No input from others is allowed. The leader asks for paraphrase to make sure he or she has been clear, and that people know what is expected of them. Military-like style. Often used with beginners, and they usually want it this way as it takes some of the fear away and puts you in the leadership position without a doubt.

Consultant/Selling

The leader makes decisions after consultation or recommendations from the group. Leader solicits group ideas and recommendations, and then decides (sometimes the leader already tentatively decides but solicits group input and reactions before making a final decision).

For novices, this style can be good for choosing lunch spots but not much else. Once participants demonstrate some capabilities, you can test the waters, so to speak.

Vote/Consensus /Participating

The followers share equally in the decision-making process. One way is to VOTE with the leader also having one vote and no veto power (except for safety), the other way is CONSENSUS where the entire group comes to a decision that everyone supports. This works on trips but not so much in skills classes. It takes some time, and you as the leader must be ready to handle conflict.

Delegating

The leader defines parameters and under what conditions he or she will intercede (if any beyond safety), then the group decides without the leader's input. This can work well in a class setting. Give the group something to problem solve, give a time limit, (boundaries) and let them have at it.

More Time to Make a Decision

The decision-making style that *empowers* your followers the most is also usually the one that takes the most time. Keep this in mind when leading. Sometimes the group is fine with NOT being empowered, especially when hungry, tired, or feeling unsafe.

4.1 Group Management

Briefing Checklist for Leaders

Leaders need to have a simple and effective brief for the group they are leading. Sometimes, it seems like there are so many things to remember that it can help to have a mental checklist to make sure that everything is covered.

One way to remember and check you have covered everything is to use the acronym: My ABCDE.

M.Y.A.B.C.D.E. stands for-

Me – Introduction and a bit about me.

You – Introductions from the group.

Area – the plan for the day, the water we will be on, and the 'type' of trip we will be undertaking.

Boats and kit – safety checks and also who has what kit and where.

Communication – how will we communicate, what signals will we use.

Doctor – an invitation for anyone to let me know any relevant medical needs and a reminder for people to carry any relevant medication.

Emergency – what to do if an incident occurs – a swim brief and what the rest of the group should do.

C.L.A.P.

The C.L.A.P. principles form a leadership framework that can be used to structure your beach talk to ensure everyone is on the same page.

C - Communication
L - Line of Sight
A - Avoidance is better than cure
P - Position of Maximum Usefulness

Communication

- Voice, whistle, hand(s), paddle, eyes, radio.
- Signals should be agreed in advance.
- KISS (**K**eep **I**t **S**hort and **S**imple)
- VHF Marine Radio – working channel?
- Cell phone – reception? Key numbers saved as favorites/speed dial.

Line of Sight

- Ideally everyone will be in view. This may not always be possible within rocky shorelines.
- As a minimum, have at least one of your fellow paddlers in your line of sight to be a link in the chain.
- Do not all leave a place of safety to deal with a rescue. Send only the minimum required number of capable rescuers and maintain line of sight using a chain of paddlers.

Avoidance is better than cure

- Create an atmosphere of mutual support within your group – Buddy System
- It is not enough to just ask someone: “How do you feel?”
- If the intent is not to avoid, then be AWARE through careful observation.
- Situational awareness – environment, group.

Position of Maximum Usefulness

- Position for effective communication.
- When protecting a feature, capable paddlers should position themselves to cover the highest risk.
- This usually means covering the problems that are most likely to occur, rather than the most dangerous hazard.
- Where can you put yourself to be ready to go?

4.2 Incident Management

Despite our best efforts at risk assessment and mitigation, sometimes things go wrong, and a Coastal Kayak Instructor must be able to demonstrate effective leadership in an emergency.

It is critical to have an **Emergency Action Plan** created for the area you will be teaching. This should list the outside agency resources that are available (coastguard, fire department, park service, etc.) contact telephone numbers, radio call signs and operating channels. Emergency landing and access points should be identified. Any radio coverage or cell service limitations should be known.

All Coastal Kayak Instructors should be trained in Wilderness First Aid as a minimum.

Instructors should be familiar with the "**S.A.F.E.R.**" mnemonic.

S - **STOP**
A - **ASSESS** risk to self, group, casualty
F - **FORMULATE** plan - consider requesting outside assistance
E - **EXECUTE** plan - evacuate casualty
R - **REASSESS** - is the plan working or do I need to try something else?

Instructors are always encouraged request assistance or at the very least notify the coastguard early in an incident.

Rescue Priorities

- Manage yourself first
- Secure the rest of the group
- Extricate the distressed paddler
- Rehabilitate the paddler

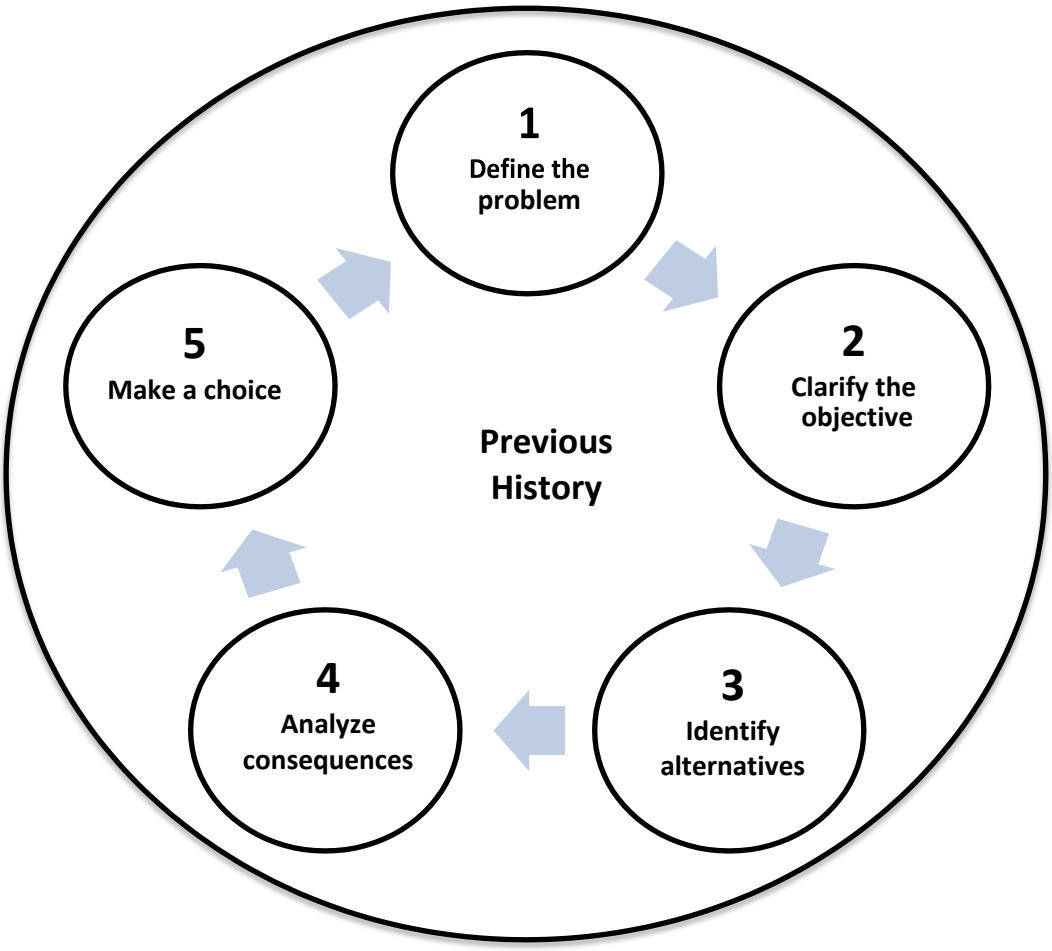
4.3 Decision-Making

Courtesy of Gordon Brown, MSc in Performance Coaching (edited)

"The key to good decision-making is not knowledge, it is understanding. We are swimming in the former. We are desperately lacking in the latter."

Gladwell, 2005

There are many ways to make a decision, some are methodical and rely on having a complete set of data, while others are seemingly effortless and rely on intuition, or at least what appears to be intuition (Klein, 2003).



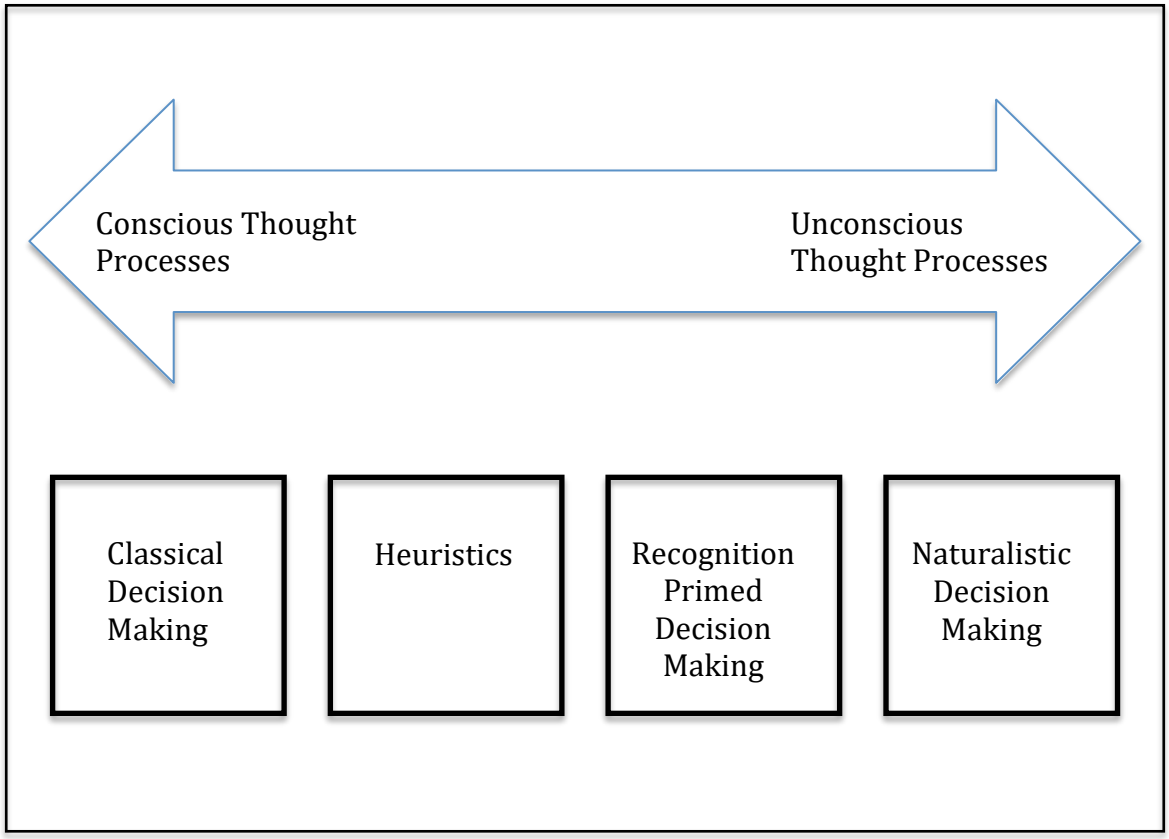
Simplified decision-making process

When decision making must take place in a dynamic, time-critical, safety-oriented environment, such as within an incident or emergency, this 'slow and sure' methodical approach does not really have much place.

Situational Awareness allows an individual to compute the best solution and find a path through the problem to come up with a workable solution. True situational awareness relies on understanding the significance of the uniqueness of the situation. This is key to understanding, detecting, clarifying and making sense of the situation. Being able to recognize a situation as characteristic of similar situations will give a better match to previously experienced situations therefore allowing greater success.

Experienced decision makers can produce and assess options and use satisficing rather than optimization to gain a result. Searching for an optimal choice can slow down the process of deciding so much that it is possible to lose complete control of the incident.

Decision making varies on a continuum from conscious, slow, precise thought (e.g. Classical) through rules of thumb (Heuristics) to situational awareness, pattern matching and mental simulation (e.g. Recognition Primed Decision Making) to seemingly effortless, unconscious thought (e.g. Naturalistic Decision Making).



Conscious Processes Decision Making
These are methodical, option narrowing or comparative approaches that work when there is time available to the decision maker and the physical environment is stable. If there is more than one option, the time taken to bring about a suitable result can be counterproductive. Less experienced leaders may use this type of decision making to formulate their answers. They rely on their limited knowledge to compare options without knowing which is the optimal one to choose.

Heuristic Decision Making
Using Heuristics (rules of thumb) can speed up the decision-making process, as tacit knowledge is used. It can also however, introduce bias and error due to previous experiences, good or bad. These errors have been described as Heuristic Traps. An example is towing where we may have been told specifically that the leader must never tow. This may have become a hard and fast rule for every situation, rather than an advisory statement.

Recognition Primed Decision Making
The fundamental process within this is that there is recognition of the situation through the context, cues received, patterns recognized and action scripts which have been simulated mentally. Experienced decision makers use this Situational Awareness to bring about a result through satisficing rather than optimization.

Naturalistic Decision Making
The domain of experts. Those without experience do not have enough expertise to mentally simulate options to allow a successful outcome. If a coach has not experienced many scenarios in real time, they cannot have assimilated the necessary detailed knowledge to allow successful completion of the task, which could be either known or unknown. This would render them sub-expert, rather than expert coaches in the area of incident awareness or management.

CONTEXT OF THE INCIDENT

If it is possible to categorize incidents using business management tools (Olarewaju, 2012) and interpreting the work of Atul Gawande (2009) in his book “The Checklist Manifesto”, the following may be of some use:

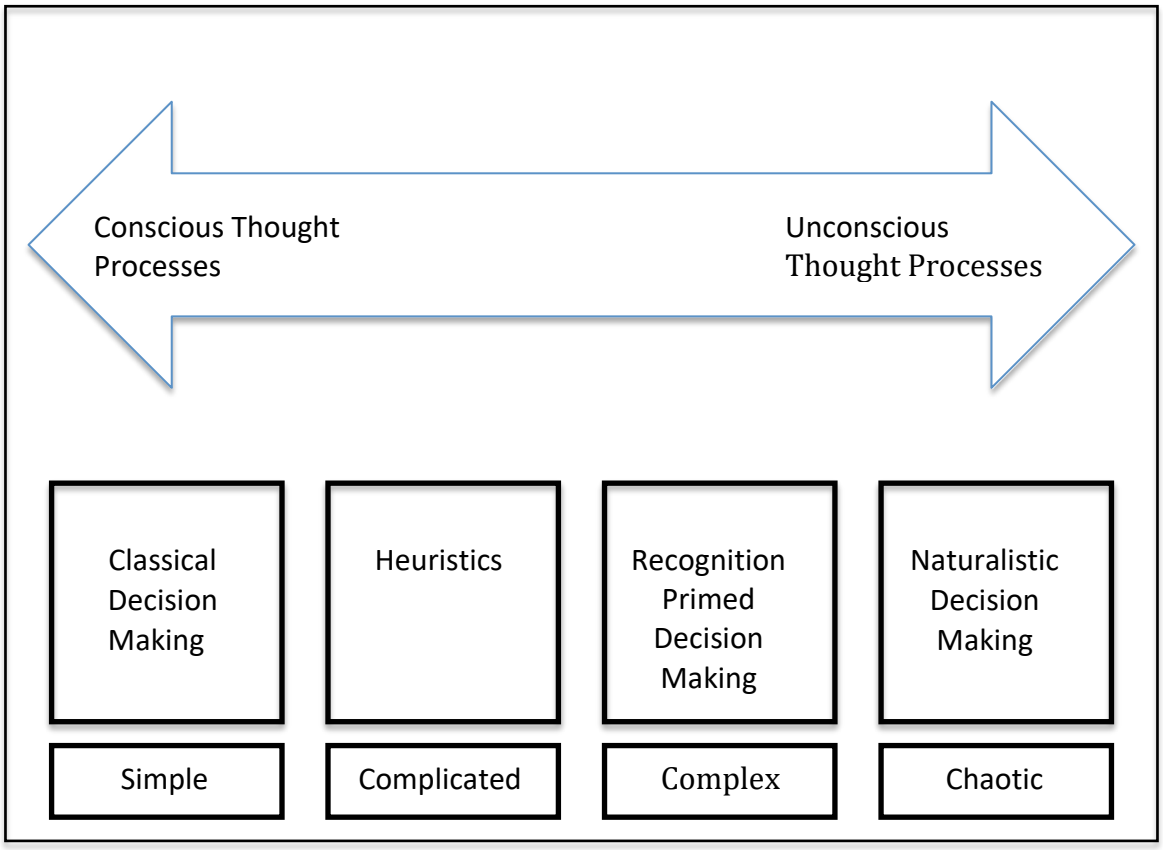
Simple – This is where everything is known and unlikely to change, everyone involved shares understanding and knowledge of the problem. Often the answer is clear and explicit.

Complicated – Not everyone can see the relationship between the trigger and the outcome and there may be many correct answers. Making decisions in this context takes time and

there is compromise in making decisions quickly or trying to get the right answer.

Complex – Here it is tempting to fall back on a 'command' style with defined plans and definite outcomes, unfortunately there are no right answers and information is mostly incomplete. Plans will fail if there is an attempt to impose order.

Chaotic – The causal relationships are in a constant state of change and there are no emerging patterns that could be used to find an answer. The best option here is to observe until a recognized pattern emerges, this can prevent future incidents as well as downgrading the incident from Chaotic to Complex.



4.4 Risk Assessment & Mitigation

THE RISK ASSESSMENT & SAFETY MANAGEMENT MODEL©
by Rick Curtis, Princeton University Outdoor Action & OutdoorEd.com

Risk is Inherent, Integral, Expected, Manufactured

Risk has been defined in many ways:

- Simon Priest (2005) has defined it as "the potential of losing something of value.[1]"
- Insurance industry defines risk as, "any uncertainty about a future event that threatens your organization's ability to accomplish its mission.[2]"

[1] Priest, S. and Gass, M., Effective Leadership in Adventure Programming, Champaign: Human Kinetics, 2005
[2] Source: The Alliance for Nonprofit Management - www.allianceonline.org/FAQ/risk_management/what_is_risk_management.faq

- Per Preston Cline of Adventure incorporated in 20 different industries there are 46 different definitions of risk,

In many ways, we have been limited by these definitions of risk as a negative concept. We see risk as this thing we have to battle against, we have to "manage" risk because it is the "enemy of safety." There are other definitions of risk. In the financial industry risk is both the potential of losing something of value and also the potential for gaining something of value. In this definition either action or inaction can lead to both positive risk and negative risk. This is a much more dynamic definition of risk and perhaps more applicable to our field.

- -R: the potential for loss/injury/illness
- +R: the potential for gain/growth/development

We all know about the negative model of risk, what is the positive side of risk in our industry? Risk is an underlying principal in all of outdoor and adventure education. The fundamental philosophical principles of Kurt Hahn and others is that the exposure to risk/challenge is what impels people to personal growth.

- **Inherent:** -R: exists in outdoor adventure activities
- **Expected:** -R can occur at any time – expect the unexpected
- **Integral:** -R and +R are essential parts of our program
- **Manufactured:** we plan programs with the understanding that there is -R

Somehow, we must reconcile these two very different concepts of risk – risk as the destroyer and risk as the creator. Without trying to be overly philosophical, there is, perhaps, a kind of Yin-Yang relationship between risk as creator and risk as destroyer. Perhaps, it is not possible for risk to act as a creative (growth) force unless there are also potential negatives that can take place. The negatives are the whetstone that sharpens the blade of creativity. How do you look at risk globally and integrate -R and +R into your program? I hope that might be an interesting discussion to have some time within your organization.

Managing Activities to Prevent Loss

Since most of us are here at this conference to focus on -R let's turn to a more in-depth look at how and why loss happens. We are going to look at how to **Manage our Program Activities to Prevent Loss.** At some other outdoor education conferences not focused on risk others can take up the discussion of how we **Manage our Program Activities to Create Gain.**

- **Early Models**

Several other models for accidents have been utilized in the past. The two best known are the Dynamics of Accidents Model© developed by Alan Hale in the early 1980's. The other is the Accident Matrix© developed by Dan Meyer (1979) and refined by Jed Williamson (1984). The limitation with these early models is that they focus primarily on the negative causative factors of the loss. While they provide a tool for examining causes *after* an accident, they don't adequately address solutions to *prevent* accidents. If the only factors you are tracking are the "negative causations" that leads one to the interpretation that reducing the possibility of the accident is accomplished only by removing or negating the negative causation. The Risk Assessment and Safety Management model (RASM) is a holistic model that combines the negative factors as well as the positive factors. This allows us to think not just on what can go wrong but also on what can go right. RASM provides program managers and field staff with a model that addresses these needs.

- **Risk/Loss Potential/Level**

The basic formula that is used for calculating the level of risk is

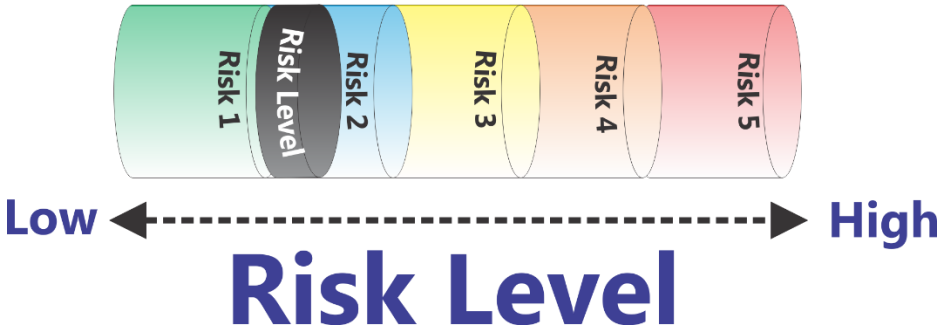
RISK = FREQUENCY/PROBABILITY OF OCCURRENCE * SEVERITY OF OUTCOME

This means that you multiply the **Probability** that something will occur **times** the **Severity** if it does. For our discussion we can set a scale of 1-10 for both Probability and Severity. That means the lowest Risk Level could be 1 and the highest level 100.

Example: The Probability that novice hikers on an extended backpacking trip will get blisters is moderate. Let's give it a 5 on a scale of 10. The Severity of blisters is low. Let's give it a scale of 2. Multiplying the two scores we get a 10 Risk Level.

In the diagram below, we can represent the Risk Level on a horizontal scale. Imagine the black disk as the Risk Level. It can move left to the Low-Risk end or right to the High-Risk end.

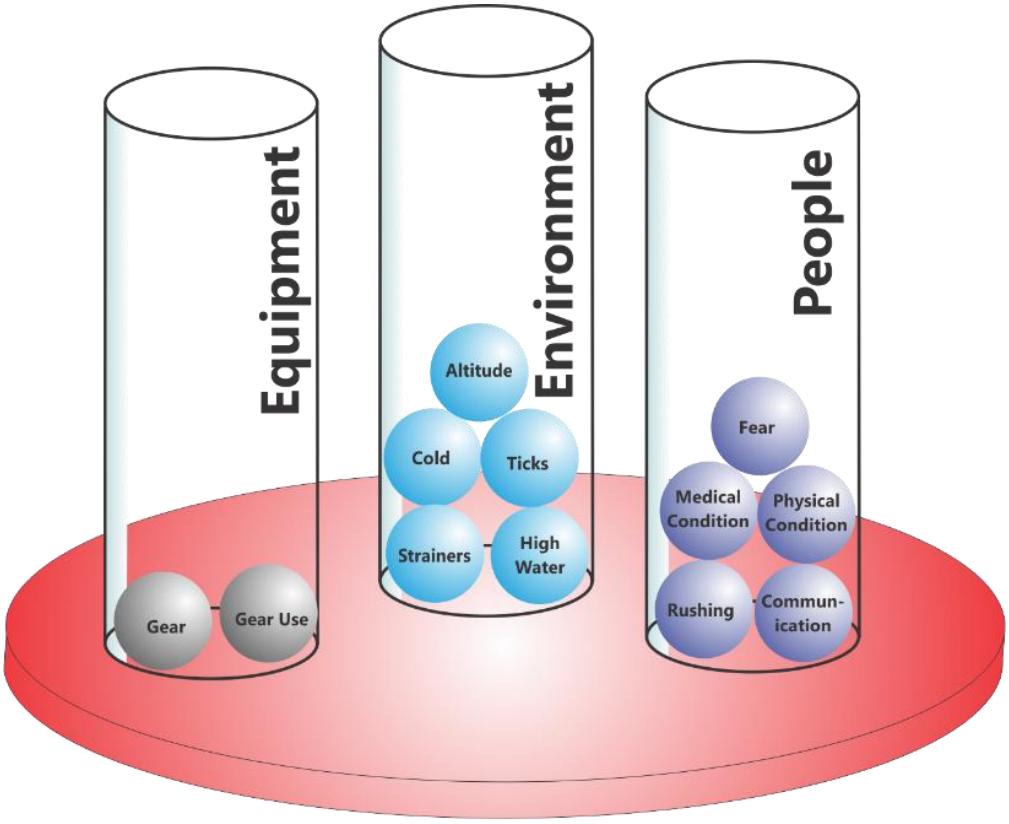
Note: For simplicities sake in the rest of this article we'll use a scale of 1-5.



- **Hazard Factors**

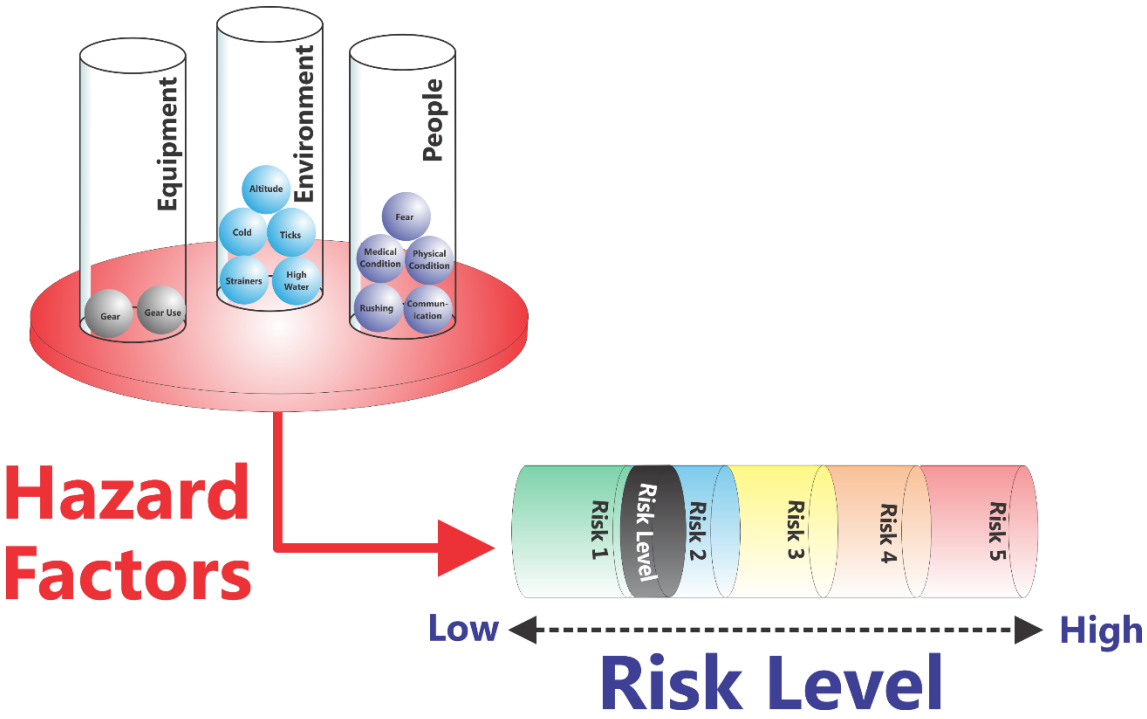
Let's imagine a balance with three different Hazard Cylinders—Environment, Equipment, and People (also known as Human Factors). Into each of these we can add hazard factors. The more the factors the greater the potential for -R.

If we look at a sample scenario, we can see each of the Hazard Factors as marbles, the more marbles in the cylinder the greater the "Hazard Weight" on the scale.



Hazard Factors

So, let's look at the overall risk assessment and safety management model in the following graphic. What you see here can be thought of as a simple balance scale. If we look on the left side, we see a series of hazard factors that fall into three categories: Environmental Hazards, Equipment Hazards, and People Hazards. In the center we see risk levels. As Hazard Factors accumulate on the left-hand side of balance scale, here shown as adding balls into the cylinders, the Risk Level cylinder increases. Increasing the risk level doesn't mean that you are going to have an accident, just that the potential for having an accident is increasing.

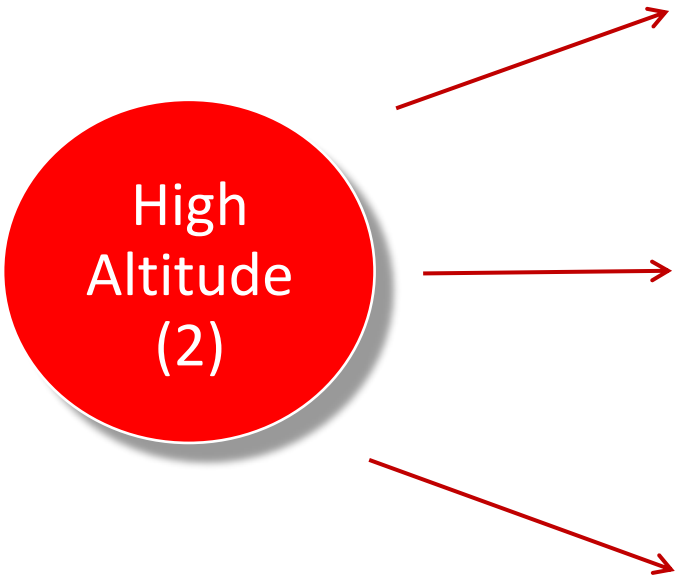


'Not All Balls are the Same Size'

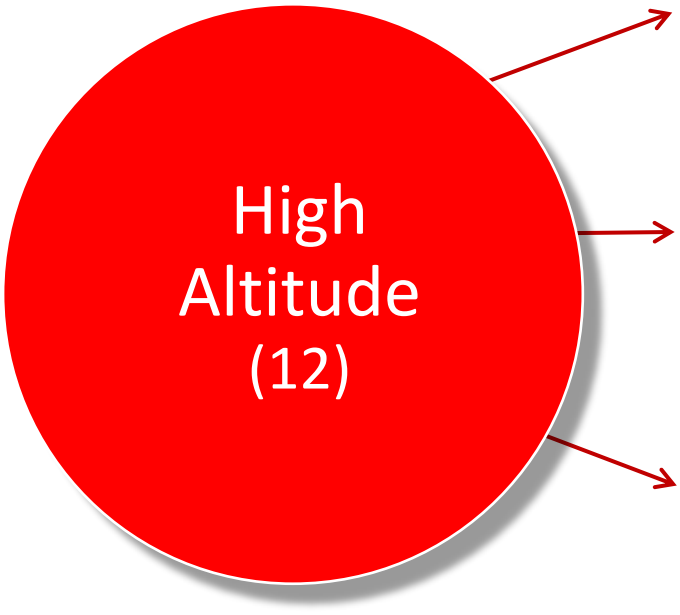
Calculating the impact of risk is more than just identifying the particular hazard. It's also important to recognize that some hazards have more impact than others. Let's take the example of High Altitude. There are several illnesses associated with High Altitude.

Environmental Risk Ball	Illnesses that Occur at High Altitude
High Altitude	• Mild Altitude Sickness • High Altitude Pulmonary Edema (HAPE) • High Altitude Cerebral Edema (HACE)

At low altitudes, the Frequency of these illnesses is low even though the Severity is high. If we assign some numbers to these, we get a Risk Level of 2, a fairly small 'ball.'

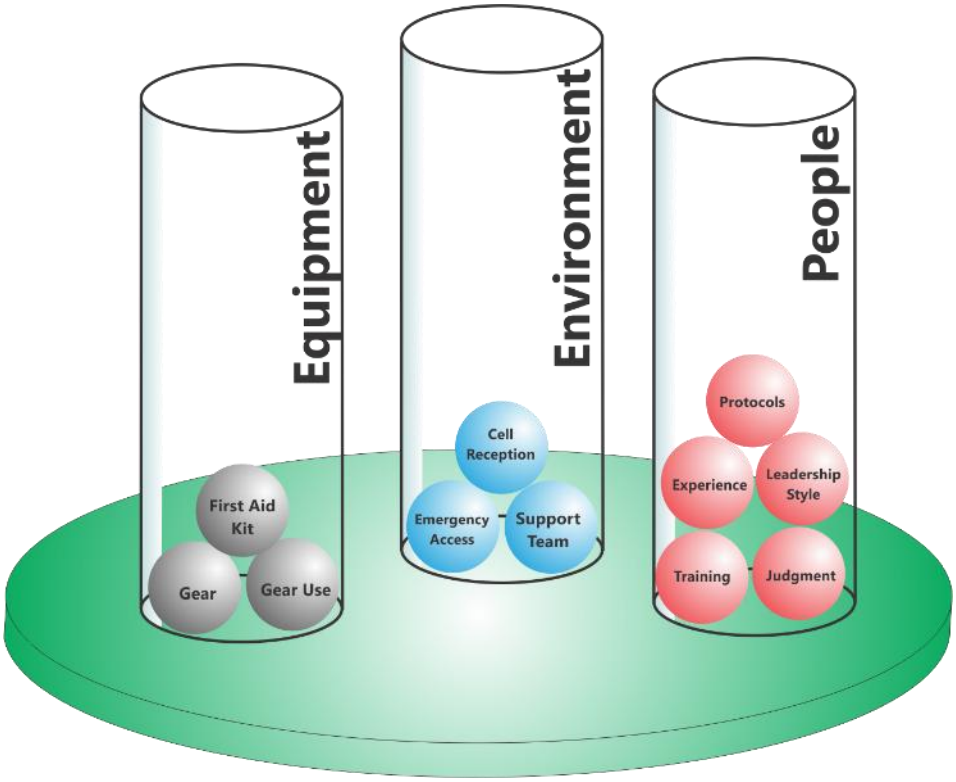
High Altitude Illness Risk	10,000 feet/3,048 meters
	• Mild Altitude Sickness Frequency High * Severity Moderate = Moderate Risk (1) • High Altitude Pulmonary Edema (HAPE) Frequency Very Low * Severity High = Low Risk (0.5) • High Altitude Cerebral Edema (HACE) Frequency Very Low * Severity High = Low Risk (0.5)

At high altitudes, the Frequency of these illnesses is high, and the Severity is high. If we assign some numbers to these, we get a Risk Level of 12, an exceptionally large 'ball.'

High Altitude Illness Risk	18,000 feet/5,486 meters
	• Mild Altitude Sickness Frequency High * Severity Moderate = Moderate Risk (2) • High Altitude Pulmonary Edema (HAPE) Frequency Moderate * Severity High = Low Risk (5) • High Altitude Cerebral Edema (HACE) Frequency Moderate * Severity High = Low Risk (5)

Safety Factors

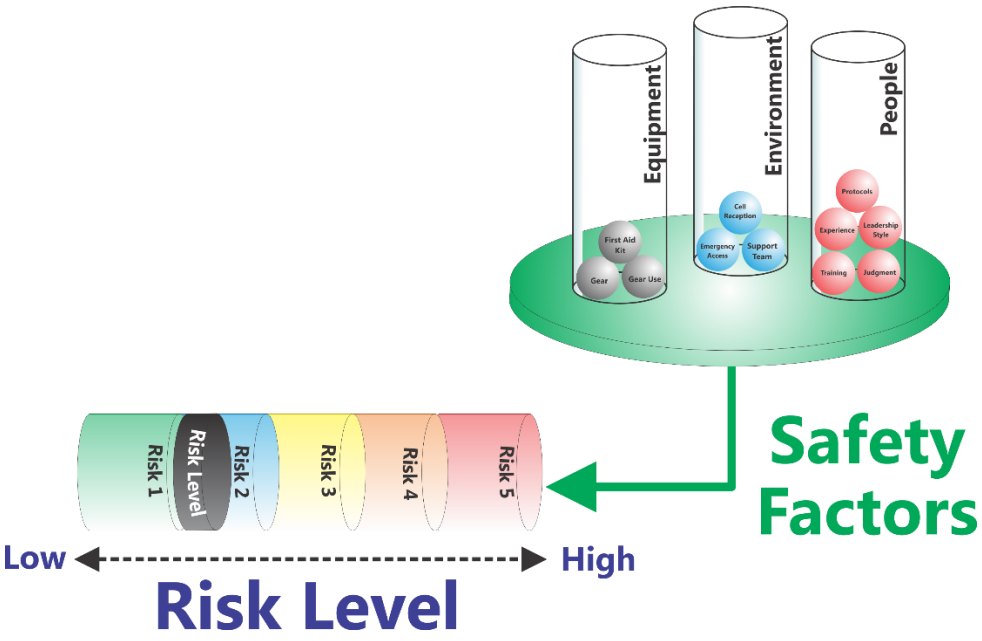
Scales of course mean that there is something being balanced against; those are the positive factors – Safety Factors that work to reduce the potential for loss. Once again, we can see each of the Safety Factors as marbles, the more marbles in the cylinder the greater the "Safety Weight" on the scale. Safety Weight acts to counterbalance Hazard Weight.



Safety Factors

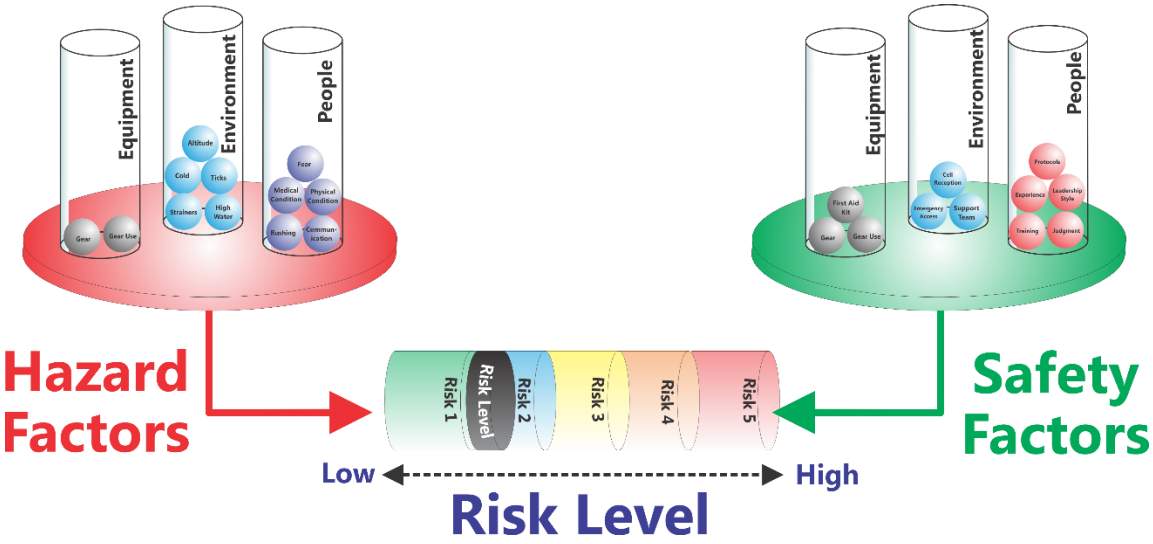
Here we can see things like Training, Protocols, Judgment, etc. all of which are things that we actively work to develop in our programs to counteract/counterbalance the Hazards Factors. Our model so far shows Hazard Factors and Safety Factors, but how do they interact to determine potential Risk/Loss?

Now we can see the other side of the RASM model. On the right side we now see another part of the balance scale–the Safety Factors–in three categories as before: Environmental Safety Factors, Equipment Safety Factors, and People Safety Factors. When we add "balls" into the Safety Factors we make the risk level go down. Of course, it will never go to zero, but we can reduce the risks by adding Safety Factors in.



Creating the Risk Management Model

Now that we have all the components of our Risk Assessment Model, let us put them all together.



The Hazard Factors operate to push the Risk Level up while the Safety Factors operate to pull the risk level down. For simplicities sake on the illustrations, all the “marbles” are shown as the same size. In fact, some may be much larger than others and ‘weigh more’ having a much

greater or lesser influence on the ultimate Risk Level. For example, having a hurricane hit your trip is a massive hazard factor made up of a series of conditions (high winds, downed trees, flooding, temperature, etc.)

Using the Model to Manage Safety

Reducing the Risk Level happens in two ways. We can reduce or neutralize the Hazards Factors, or we can increase the Safety Factors. The thing that is important to realize is that many Hazards and Safety Factors are completely interchangeable, that is they can be either one or the other. Decision Making for example, can either be a Safety Factor if it is done well or a Hazard Factor if it is done poorly or not at all.

Risk Assessment & Safety Management Model Synopsis

1. Assess the Risk Level
2. Remove all the Hazards you can
3. Reassess the Risk Level - what if that's not enough?
4. Add Safety Factors
5. Reassess the Risk Level - what if that's not enough?
6. Bail Out!

Many people are familiar with the Patient Assessment System (PAS) taught in first aid courses. The Risk Assessment & Safety Management Model follows a similar pattern. I find that it's helpful in teaching RASM to link it to concepts that people are already familiar with. Start with a baseline assessment of the Risk Level (First Triangle: do the scene size up to assess safety, mechanisms of injury and number of patients). Treat the immediate hazards (Second Triangle: solve primary system problems). Reassess the risk level (Third Triangle: do a full patient physical, SAMPLE history and vital signs). Add Safety Factors (develop a problem list and treat your patient). Reassess the risk level (continue to monitor).

Bailing Out

There are situations where you simply cannot reduce the Risk Level to something acceptable for your program. In that case 'bailing out' should always be seen by staff as an option. Bailing out can mean many things depending on the situation and location. It can mean camping in place, changing the route or even ending the trip. Letting staff know that this is acceptable is one more "Safety Ball" for your program.

Modifying Safety Response Levels

We talked about adding Safety Factors. To dive into this more deeply we can add the concept of Safety Response Levels which are phased increases in safety readiness. Obviously, we are

always alert for hazards and are actively trying to reduce the potential for loss. However, as the Risk Level changes, so must our actions and leadership behavior. We must "boost the radar" in both Safety Actions and in Risk Response Readiness, our capacity to respond.

- **Safety Response Level 1** - Normal response readiness
- **Safety Response Level 2 -** Normal response readiness, increased safety alertness
- **Safety Response Level 3** - Above normal response readiness, increased safety alertness,
- **Safety Response Level 4** - Further increase in safety readiness, but less than maximum readiness
- **Safety Response Level 5 -** Maximum safety alertness & maximum response readiness.

Safety Response Levels

Safety Response Level	**Risk Response Readiness**	**Safety Actions**
Level 1	Normal	Normal
Level 2	Normal	Slight Increase
Level 3	Slight Increase	Significant Increase
Level 4	Significant Increase	Significant Increase
Level 5	Maximum Increase	Maximum Increase

Okay so we have these different levels, what do we do with them? There are three aspects to using the RASM model.

1. Identification of the negative Hazard Factors that serve to increase the Risk Potential.
2. Identification of the positive Safety Factors embodied in your programs which are designed to counteract hazards.
3. Determine the Current Safety Response Level and apply the appropriate policies/procedures for that level.

We can think that as the Hazard Factors increase and/or Safety Factors decrease then the Risk Level goes up and the Safety Response Level rises. Safety Factors can also be thought of as your Resource Level, your capacity to respond to an emergency or incident. At each point where you cross into a higher Safety Response Level, your operating protocols and guidelines may need to change.

Risk Levels vary based on…

Level	**Risk Level**	**Resource Level (Safety Factors) = Capacity to Respond (CTR)**
Risk Level 1	Routine – the base level of program operations. It assumes the activity	Optimal – all standard program resources are operating in an optimal fashion

	is exposed to the Inherent Risks identified.	
Risk Level 2	Increased	Optimal
Risk Level 2	Routine	Sub-Optimal
Risk Level 3	Significantly Increased	Optimal
Risk Level 3	Increased	Sub-Optimal
Risk Level 4	Significantly Increased	Sub-Optimal
Risk Level 5	Significantly Increased	Significantly Sub-Optimal

EXAMPLE – On Star Trek Scotty calls up from Engineering "Cap'n the Klingons are attacking and the shields are down to 20%. What are we going to do?" So both the Hazards are increasing and the Resource Level (Capacity to Respond) is reduced. That means you need to move to a higher Safety Response Level.

One of the most familiar uses of the concept of Safety Response Levels comes in whitewater paddling. The International River Classification Levels are comparable to Safety Response Levels, the higher the level the greater the potential for loss. What is also true in the River Classification system is as the level of difficulty increases, the Resource Level (skill level, judgment, etc.) of instructors and participants needs to increase in order to maintain operation at an acceptable Risk Level.

In whitewater paddling moving from one level to a higher level often means changes in operations. Even on one river. Say a group is paddling on Class III and scouting from the river. They come to a class IV and scout from shore, potentially set up rescue lines below, add safety boats, etc.

Whitewater Class/ Risk Level	**Safety Response Level**
Class 1	**Base Level:** Basic equipment, river knowledge, checking river conditions
Class 2	+ Lead & sweep boats or buddy system, basic river rescue equipment
Class 3	+ Scouting from boats, river rescue training
Class 4	+ Scouting from shore, Safety boats
Class 5	+ Screening of paddlers, Required scouting from shore, Safety Lines set up
Class 6	+ Decision-making plan of running drop

In the RASM model any change in **Risk Level** may require a **Protocol/Safety Action Change** to compensate. Part of your program strategy has to be identifying the highest Safety Response Level your program can operate on. At the same time staff need to be able to assess the Safety

Response Level. If you are operating at a Safety Response Level beyond your capacity, you are at significant risk for a catastrophic system failure.

Protocols therefore should be looked at as Safe Response Level dependent. There are minimum level protocols that are used in all aspects of your program (things like medical screening, equipment checks, etc.). These protocols exist at Safety Response Level 1 and remain in effect throughout. Others change as we saw in the whitewater paddling example. It is important to recognize when a threshold level is reached that places you in a different Safety Response Level and then know what changes in operating protocols are appropriate for that Safety Response Level. You will need to continue to monitor your Risk Level and Resource Level to check the Safety Response Level and modify your procedures accordingly.

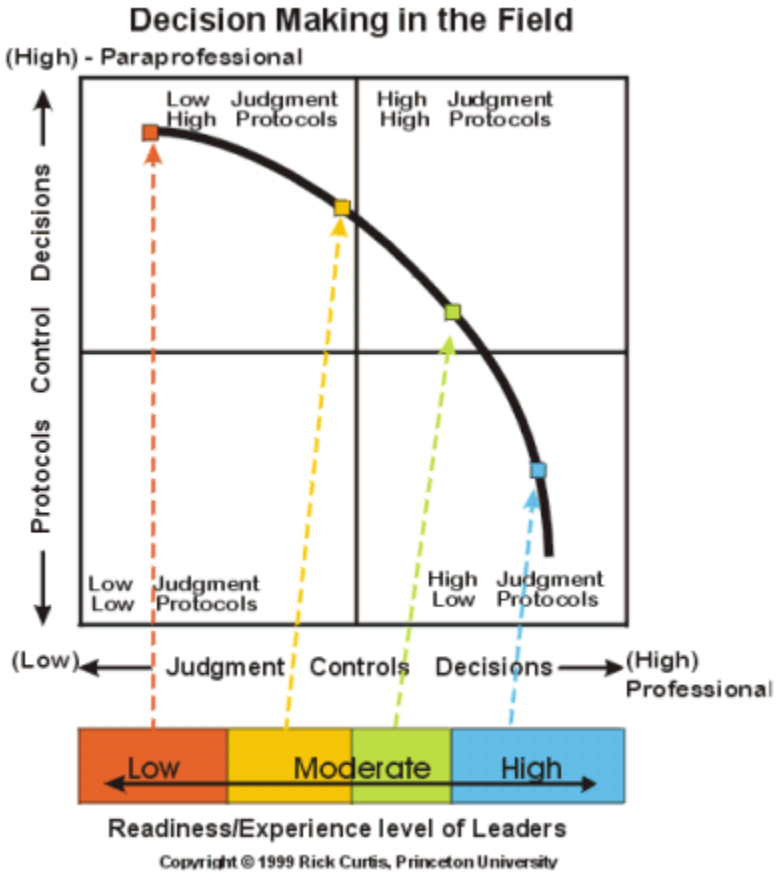
"Rules are for Fools"

Paul Petzoldt, founder of NOLS and WEA once said, "Rules are for fools." This has sometimes been misinterpreted to mean that there should be no rules simply rely on instructor judgment. Drew Leemon, the NOLS Risk Manager, once asked Petzoldt what he meant. Petzoldt replied that he meant was that there was no way to write a rulebook that would cover every situation an outdoor leader might encounter. So you couldn't have a rule for every situation. At the same time he didn't mean that you should have no rules. The real goal for instructor judgment is to be able to determine if you should implement the rule or if the situation required that you do something else.

I once had a long discussion with one of my leaders about this. I had said that student leaders need to follow program protocols and that they also needed to use their judgment. She became very flustered by this. She wanted one answer, "do I follow the protocol or decide on my own?" I told her that she should follow the protocol but that didn't mean turning her brain off. To use a different example, soldiers are supposed to follow orders in the field. At the same time soldiers are not supposed to simply turn off their brains. They need to be able to question orders if those orders don't make sense.

The Place for Rules

So there must be a place for rules within the risk management context. We have to balance the rules, protocols, etc. developed as part of our RASM Model with sound judgment by instructors on when to apply those rules. The diagram below shows a basic model for identifying a balance between rules and instructor judgment. For working with a college outdoor education program my point on the curve is up and to the left. For an experienced mountain or river guide the point will be further down and to the right.



Even Experts Make Mistakes

Even the most experienced people can make mistakes. I tell a story about when I was on a trekking trip in Nepal with a group of sixteen people. We hiking over the Thorung La Pass on the Annapurna Circuit. We arrived at 14,500 feet and the next day were to hike up to the top of the pass at 17,700 feet and back down to the next village at 12,500 feet. When we woke up for our predawn start it was snowing heavily and below 0° F. Normal temperatures on top of the pass were supposed to be 30 F so no one had warm enough gear. You could barely see 50 feet in front of you. Our professional mountain guide insisted that it was fine for us to go ahead. I looked at the "Risk Balls" and decided that the **Probability** of a **Severe** accident (hypothermia, frostbite, high altitude pulmonary edema, high altitude cerebral edema) was way too high and finally talked the guide out of going. Our group stayed behind (as did most of the other trekking groups that day). The one group that tried to get over the pass didn't make it. They had to turn back when one of their participants got severe frostbite. He wasn't able to walk and they had to send a pony up to bring him back down. The moral of this story (similar to the Into Thin Air story) is that experts can and do make mistakes. If you see something that feels wrong or risky, Step Up and Say Something. If you don't, you have become a significant People Hazard because of your silence.

Conclusion

The final thought I'd like to leave you with is about our desire for risk. In our cultures, our socio-economic groups we can look at risk as something of a luxury. We don't have to worry or struggle for each day to stay alive like many in the developing world. For these people there is only –R. Activities like kayaking, ropes courses, rock climbing, are foreign concepts. My choice to go whitewater paddling and placing myself at risk is at the self-actualization end of Maslow's Hierarchy of Needs. I am pursuing +R by exposing myself to –R. Much of the rest of the world is still fighting just for the basics. They experience more than their share of –R with much more dire consequences. So I would ask each of us to think about how what we are doing to create self-actualization for those who already have so much, how that will come back as a positive impact on those who have so little. I hope that each of us will make the time within our organizations to wrestle with that question.

Bibliography

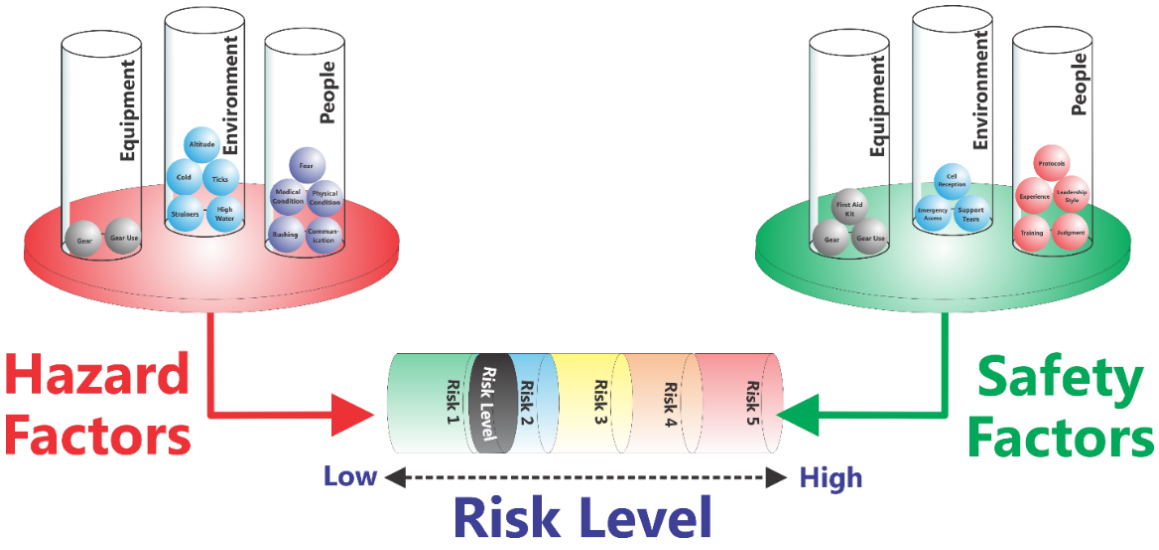
Risk Management Basics – Risk Management Resource Center - http://www.eriskcenter.org/knowledge/normac/basics.html

Priest, S. and Gass, M., Effective Leadership in Adventure Programming, Champaign: Human Kinetics, 2005

Take Home Action Steps:

- **For each program activity brainstorm a list of Hazard Factors in each of the three major categories (Environment, Equipment, People)**
- **For each program activity brainstorm a list of Safety Factors in each of the three major categories (Environment, Equipment, People) designed to mitigate against Hazard Factors**
- **Balance the Hazard Factors against the Safety Factors and determine the range of Risk Levels you will be operating in. Based on your program, decide whether the Risk Level is acceptable or not.**
- **If not, determine where to make changes (reducing hazard factors, increasing safety factors, or both) to reach an acceptable Risk Level.**

RASM Analysis Form

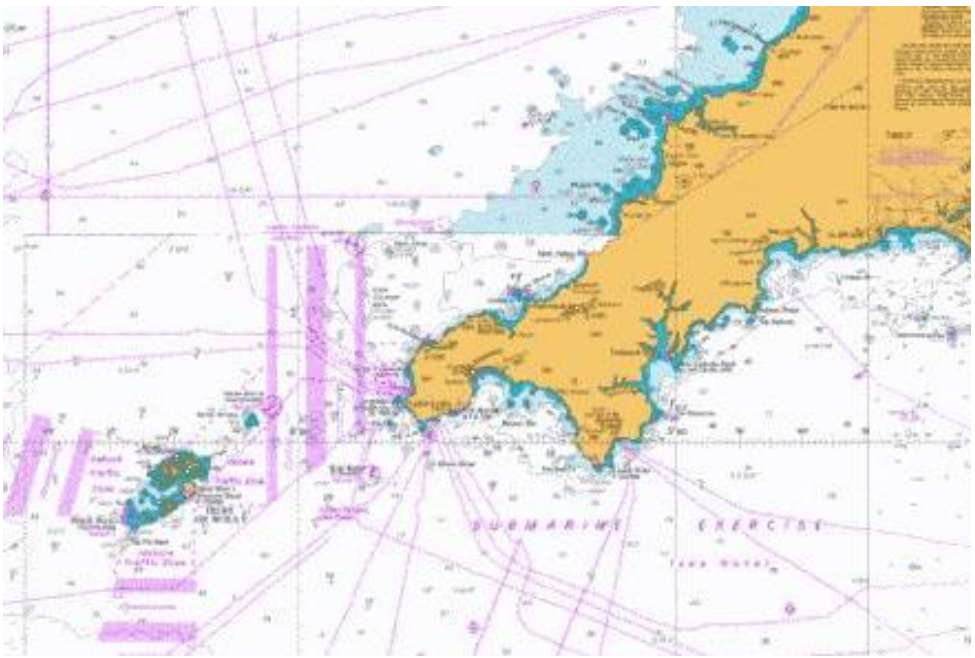


Hazard Factors			Risk Level	Safety Factors		
Equipment	**Environment**	**People**		**Equipment**	**Environment**	**People**

EXAMPLE OF AN EXPEDITION RISK ASSESSMENT

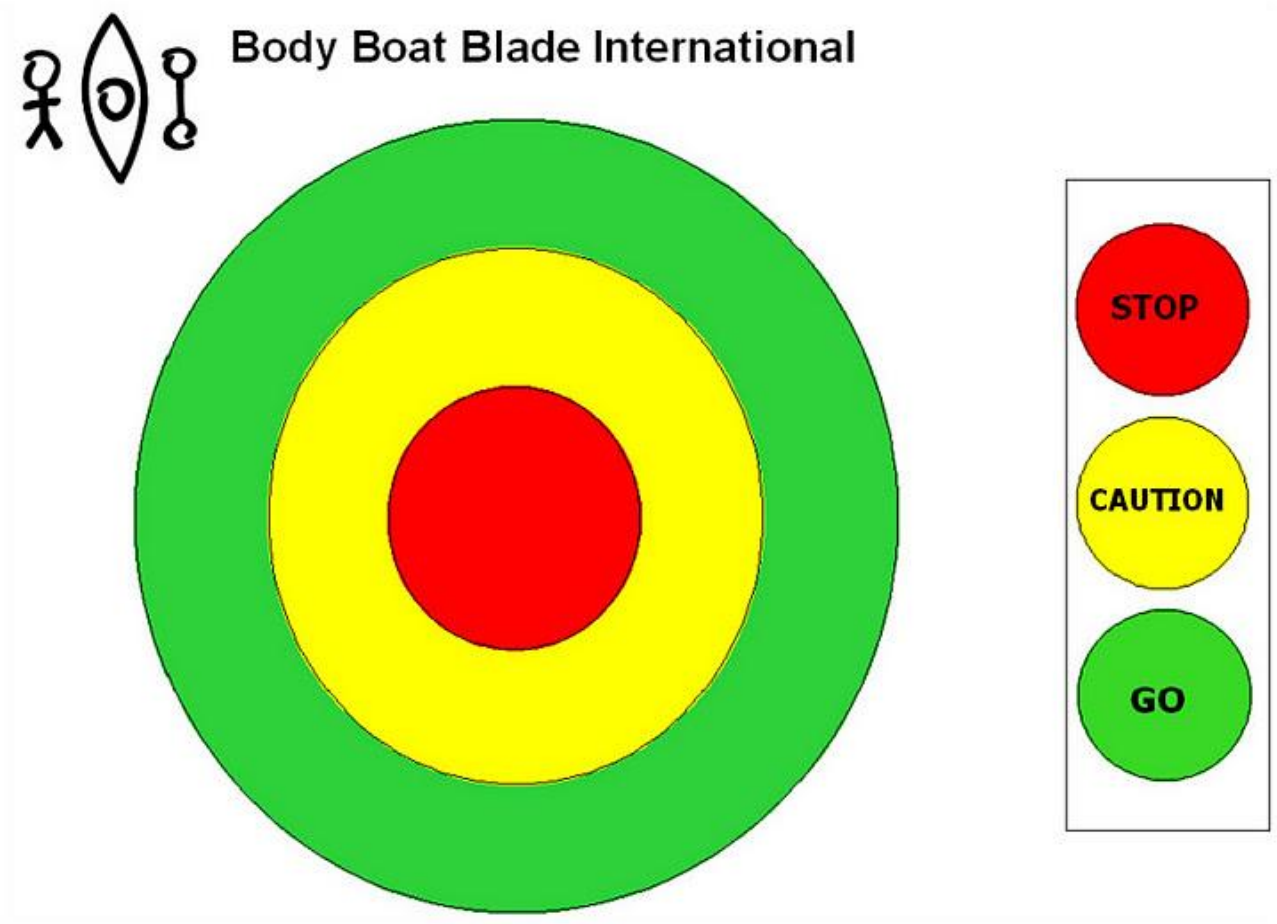
http://www.expeditionkayak.com/resources/risk-assessment/

PADDLE LEG	HAZARDS	Risk prior to controls H/M/L	CONTROL MEASURES TO BE IMPLEMENTED	Risk with controls in place H/M/L
1. Sennen Cove to St Martin's, Isles of Scilly *(22.5 NM crossing)*	1(a) Tidal race, over-falls and reefs between Land's End and Longships 1(b) Shipping Channels 1(c) Seven Stones Reefs 1(d) Being taken too far N or S	H M M H	1(a) Begin crossing HW Devonport +0300. Stay well north of Longships 1(b) Only attempt the crossing with good visibility. Cross at right angles. Always pass astern of any vessels. Have collision-warning flares readily available. Have immediate access to VHF Ch 161(c) Pass well to the S of Seven Stones 1(d) Make allowances for wind and wave conditions. Maintain steady pace throughout crossing. Double check position and course with GPS using waypoints during crossing. Only attempt crossing in good visibility. Only attempt crossing when wind is in sector N to SE < F5, SE to NE < F4. Stay N of flight path of helicopters. **Only attempt if 5 day forecast is satisfactory and gives realistic prospect of completing return crossing. If forecast is unsatisfactory consider aborting crossing (may be attempted again at end of expedition)** **Escort vessel to be on stand-by in case of a problem**	M L L M



RISK ASSESSMENT TOOLS

1. Draw a bull's eye on the beach.
2. Ask group to think of hazards relevant to the area you will be paddling.
3. Place an object representing each hazard in the appropriate circle.
4. If there are too many objects in the yellow circle, consider if you can take steps to mitigate the risk.
5. If there are objects in the red circle you should reconsider your plan.



Individual perception of risk can vary considerably. Novices may perceive a high level of risk when the reality is that the actual risk is low. Conversely, a novice may be ignorant of the risk present – they don't know what they don't know.

Ego and gender play a significant role in risk assessment and whenever possible encourage participants to be honest about their concerns.

RISK ASSESSMENT – Check List

WEATHER

BIG PICTURE - SYNOPSIS
- Improving
- Worsening

WIND
- Speed (Now / Later)
- Direction (Now / Later)
- On Shore
- Off Shore
- Relation to current

RAIN / SUN
- Temperature
- Psychology

VISIBILITY
- Fog
- Night/Dusk

THUNDERSTORMS

LAND

LANDSCAPE
- Terrain
- Remoteness

OUTS
- Roads
- Help

LANDINGS
- Swell
- Beach Type
- Tide

WILDLIFE/OTHER HAZARDS

OTHER FACTORS

SUNRISE/SUNSET
VHF COVERAGE
BOAT TRAFFIC AND SHIPPING

WATER

SWELL
- Size
- Period
- Direction

WIND WAVES
- On Shore
- Off Shore
- In relation to Currents

TIDES
- High
- Low
- Range
- Relation to off shore boomers
- Relation to on shore break

CURRENTS
- Speed
- Direction
- Relation to wind waves
- Relation to Swell
- Relation to Races and Over-falls

INDIVDIUALS

LEADER(S)
- Appropriately qualified for conditions
- Attitude to risk
- Ability to deal with emergency

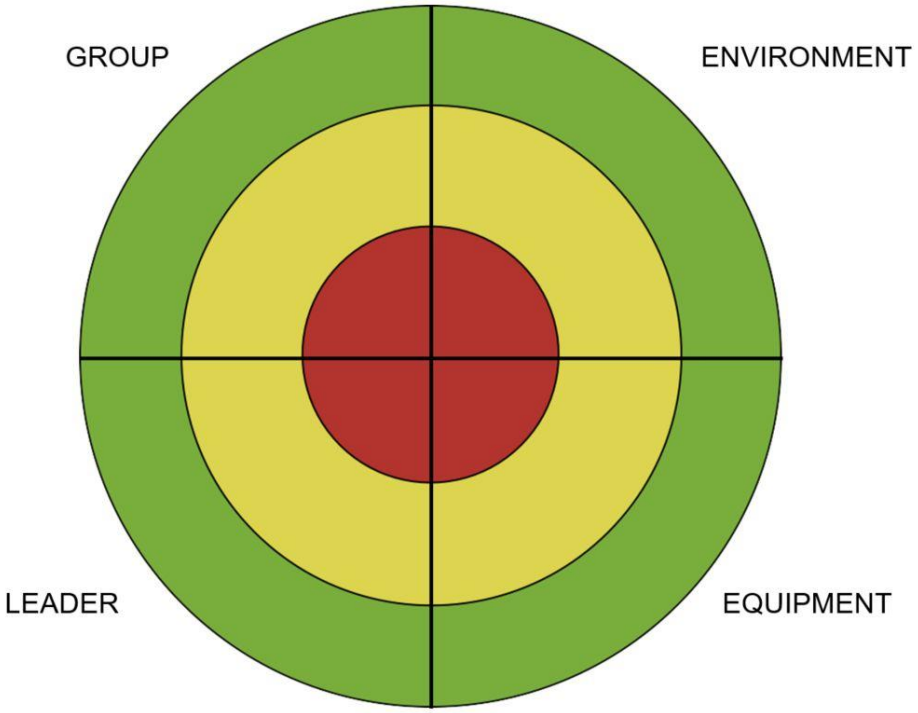
GROUP
- Ability to deal with conditions

STRENGTH
- Physical
- Mental
- Skills

PERSONAL EQUIPMENT
- Body
- Boat
- Safety
- Visibility

HEALTH CONCERNS

Gordon Brown uses a modified Bull's Eye tool:



Risk Assessment Matrix	YES	Don't know	NO
Are all permissions (consent, NOK, …) in place?			
Are you working within your remit?			
Is everyone able to carry out the plan?			
Do you have **ALL** of your equipment with you?			
Is everyone correctly equipped?			
Have you a designated Shore Based Contact (and left a float plan)?			
Have you got a weather forecast?			
Have you worked out Tides & Currents?			
Have you considered all other environmental variations?			
Is it safe to start the activity?			
Safe to go ahead with plan			
Consider, think, act			
STOP			

Group Risk Assessment		Tick the box next to your signature to show your opinion about the planned activity.		
Date:	Location:			
Leader:				
Planned Activity:				
Name	Signature	Safe	Not Sure	Not Safe

4.5 Medical Emergency Protocol

The following documents may be used to manage an incident.

They should be printed and laminated and carried either in your first aid kit or chart case.

Wilderness First Responder SOAP Note

Name _____ **Date**_____

Location_____

Subjective/Summary/Story *(age, sex, chief complaint, OPQRST, MOI/HPI).*

_____

_____

Objective/Observations/Findings *(Describe position found. Describe injuries).*

_____

_____

Patient Exam _____

_____

_____

Vital Signs

Time	_____	_____	_____
LOR	_____	_____	_____
HR	_____	_____	_____
RR	_____	_____	_____
SCTM	_____	_____	_____
BP	_____	_____	_____
Pupils	_____	_____	_____
Temp	_____	_____	_____

History

Symptoms_____

Allergies_____

Medications_____

Pertinent Medical History_____

Last Intake/Output_____

Events recent _____

Assessment *(List Problems)* _____

_____

_____

Plan *(Plan for each problem)*_____

_____

Anticipated problems _____

_____

VERBAL SOAP NOTE

Subjective/Summary/Story What, Who, Where

- *"This is (name) with a patient report/evac request."*
- *"We are currently located at:….."*
- *"I have a (?) year old (M/F) whose chief complaint is:….."*
- *"The cause of the injury/illness is:….."*
- *"The patient is currently (LOR):….."*

Objective/Observations/Findings Head to Toe, Vitals, Patient History

- *"Pt has:….." (List relevant injuries/key signs of illness)*
- *"The patient's vital signs are: stable/unstable." (If unstable, give details)*
- *"Pertinent SAMPLE history includes:….." (Only relevant findings)*

Assessment: Problem List

- *"We suspect the following problems:….."*

Plan Treatment

1. *"Our treatment has included:….." (If appropriate, include focused spine assessment)*

Evacuation

- *"Our evacuation/bivouac plan is to:….."*

Request

- *"I request the following supplies/support:….."*

Marine VHF Channels in the San Francisco Bay Area - Used by Kayakers

Channel Number	Use
09	Boater Calling. Commercial and Non-Commercial. Also used to hail many drawbridge operators, especially common in the Sacramento Delta region.
12	Port Operations - VTS, Ship movements in the approaches to San Francisco Bay. Regular broadcasts of the reported movement of large vessels transiting the approaches to San Francisco Bay are made at 15 minutes and 45 minutes after the hour.
14	Port Operations - VTS, Ship movements inside San Francisco Bay
16	International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel. If used for ship to ship calling, switch to a "non-commercial" or "commercial working channel based upon your type of vessel.
22A	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.
68	Non-Commercial
69	Non-Commercial
71	Non-Commercial
72	Non-Commercial (Intership only)
78A	Non-Commercial

- **Radio won't transmit – make sure you are not in weather or scan mode.**
- **They can't hear me – adjust power setting, hold radio 4" from mouth, press and hold PTT button BEFORE speaking**
- **I can't hear anything – adjust squelch level – it is probably too high**
- **Noise comes out of speakers all the time – adjust squelch level – it is probably too low**

Procedure for VHF Channel 16 MAYDAY:

If you have a VHF marine radio, tune it to channel 16. Unless you know you are outside VHF range of shore and ships, call on channel 16 first.
Distress signal "MAYDAY", spoken three times.
The words "THIS IS", spoken once.
Name of vessel in distress (spoken three times) and call sign or boat registration number, spoken once.
Repeat "MAYDAY" and name of vessel, spoken once.
Give position of vessel by latitude or longitude or by bearing (true or magnetic, state which) and distance to a well-known landmark such as a navigational aid or small island, or in any terms which will assist a responding station in locating the vessel in distress. Include any information on vessel movement such as course, speed and destination.
Nature of distress (sinking, fire etc.).
Kind of assistance desired.
Number of persons onboard.
Any other information which might facilitate rescue, such as length or tonnage of vessel, number of persons needing medical attention, color hull, cabin, masks, etc.
The word "OVER"
Stay by the radio if possible. Even after the message has been received, the Coast Guard can find you more quickly if you can transmit a signal on which a rescue boat or aircraft can home.

For example:

MAYDAY-MAYDAY-MAYDAY
THIS IS BLUE DUCK-BLUE DUCK-BLUE DUCK WA1234 MAYDAY THIS IS BLUE DUCK
CAPE HENRY LIGHT BEARS 185 DEGREES MAGNETIC-DISTANCE 2 MILES
STRUCK SUBMERGED OBJECT
NEED PUMPS-MEDICAL ASSISTANCE AND TOW
THREE ADULTS, TWO CHILDREN ONBOARD
ONE PERSON COMPOUND FRACTURE OF ARM
ESTIMATE CAN REMAIN AFLOAT TWO HOURS
BLUE DUCK IS THIRTY TWO FOOT CABIN CRUISER-WHITE HULL-BLUE DECK HOUSE
OVER

Repeat at intervals until an answer is received.

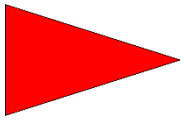
5. Coastal Environments

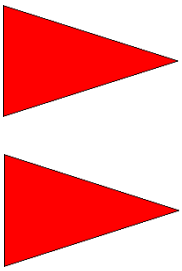
Teaching to the environment is the foundation of coastal kayak instruction. Here we will look at some principles, concepts, teaching tools, guidance and advice on teaching in Wind, Surf, Rock Gardens and Tidal Currents.

5.1 Teaching in Wind

If our goal as an instructor is to help our students become self-reliant, paddling with efficiency and control in wind is an important skill they must have. Perhaps more important is the ability to predict the conditions that they are likely to encounter during a paddle.

Students need to know how to obtain reliable a weather forecast; internet, weather radio, marine VHF radio weather channels, harbor master office, etc. They should understand the difference between the NOAA Marine Zone & Point forecasts and the meaning of Wind Warnings, Watches and Advisories.

Small Craft Advisory - 

Gale Warning - 

Other important topics for discussions include:

- significance of the wind direction and resultant fetch
- daily variations (sea breezes)
- trend in the forecast
- potential for squalls (thunderstorms, weather fronts)
- downdraughts (high cliffs or coastal mountains)
- katabatic winds (glaciers or ice sheets)

TEACHING TIP
For a visual and interactive activity, use photocopies of charts and have students shade areas of the chart green, yellow and red according to the level of risk presented by the wind according to the direction of the wind and the fetch. Use the forecast of the day, and then add some variables to demonstrate how safe areas to paddle would change with a different forecast. The same activity can be done with a single chart, an acetate sheet and dry markers.

SKEGS & RUDDERS

Some instructors allow personal bias to influence how they approach the topic of skegs vs. rudders. Some kayaks are designed to work best with a rudder deployed, some kayak designs need a skeg to be controllable in wind and just a few kayaks seem to work well without the need for a skeg or rudder. Intended use, skill level, experience, physical fitness, body type and personal preference may all be factors that influence whether your students should seek a kayak with a rudder, skeg or neither. Very often the buying decision will be based around cost, weight and availability.

There is a reason why all racing kayaks and surf skis have rudders and why the likes of Paul Caffyn and Freya Hoffmeister chose to use kayaks with rudders for their epic journeys around continents of Australia and South America. If designed and set up correctly, a rudder is more efficient than a skeg and requires less effort to keep the kayak straight in beam and following seas. A skeg can also be extremely effective but requires practice to deploy effectively.

During a lesson on paddling in wind you should:

- Introduce the topic of weather cocking/lee cocking.
- Discuss and practice how skegs work.
- Discuss the pros and cons of skegs versus rudders.
- Discuss the pros and cons of toe control (gas pedal) style rudder control versus sliding track systems.
- Have students conduct a buddy check to ensure that skegs and rudders are operating properly.
- Encourage the use of skegs and rudders but have students practice paddling without them to help them form strategies on what to do if their skeg or rudder fails.
- Discuss and practice changing the trim of a loaded kayak to effect how it handles in wind.

TURNING A KAYAK IN WIND

The ability to turn a kayak up wind and downwind is a critical skill that students must be able to perform with and without the use of a skeg or rudder. Understanding the forces acting on the kayak and how to utilize these forces to achieve the desired result require experimentation and practice. It is likely that your students will be paddling a variety of kayaks that have different handling properties. Guided discovery is an excellent method for delivering this topic:

- Start by having students sit in their kayaks broadside to the wind and not paddling – see what happens to the direction the kayak is pointing.
- Have them paddle forwards – see what happens.
- Have them paddle backwards – see what happens.
- Practice edging in wind (and waves) to aid turning.
- Introduce forward sweep with low brace recovery to assist in turning.

- Introduce reverse sweep with high brace recovery to assist turning in waves.
- Introduce timing the sweep stroke and edge with the wave crest.

Teaching in windy conditions is challenging. Communication can be difficult. Separation can be a problem. Nominate a marine VHF channel for boat to boat communication; identify a safe zone and discuss the action plan should a capsize and wet exit occur – e.g. students that are not involved in the rescue should cease practice activity and return to the safe zone. Line of sight should be maintained with the rescue and if necessary communicate via whistle and paddle signals, or marine VHF radio.

BEAUFORT SCALE
The Beaufort Scale, developed in 1805 by Sir Francis Beaufort, U.K. Royal Navy which is used in the U.K. Met Office marine forecasts, is an empirical measure for describing wind intensity based on observed sea conditions. Though not used by NOAA, or Environment Canada, the Beaufort Scale does provide a useful reference when trying to visualize what a forecast actually means in terms of likely sea conditions.

Note:
*Wave height values refer to well-developed wind waves on the open sea.
*The lag effect between the wind getting up and the sea increasing should be borne in mind.

TIP:
To convert knots to mph multiply by 1.15,
for m/s multiply by 0.514

Beaufort wind force scale

The Beaufort scale, which is used in Met Office marine forecasts, is an empirical measure for describing wind intensity based on observed sea conditions.

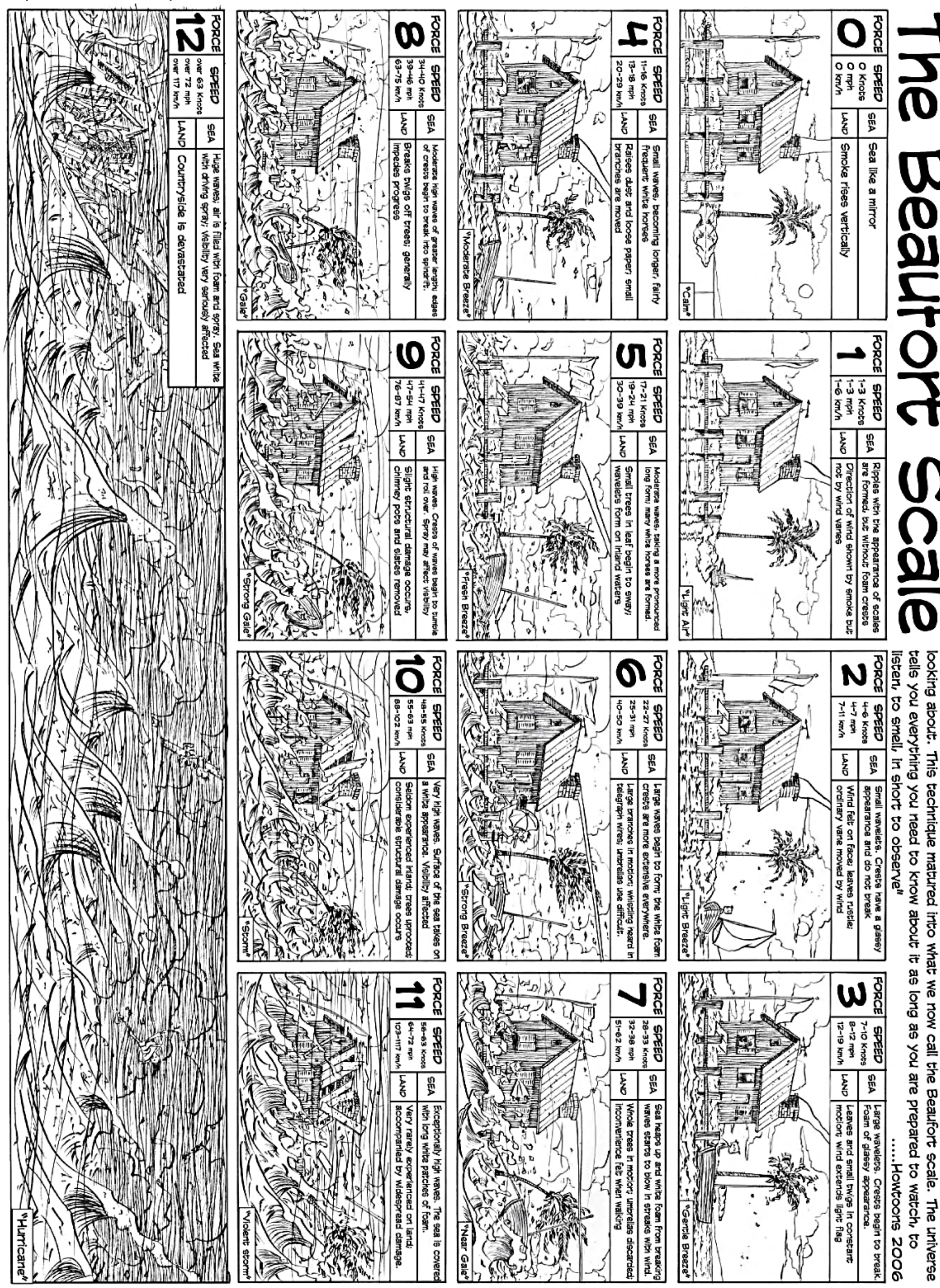
Specifications and equivalent speeds

Beaufort wind scale	Mean Wind Speed		Limits of wind speed		Wind descriptive terms	Probable wave height	Probable maximum wave height	Seastate	Sea descriptive terms
	Knots	ms^{-1}	Knots	ms^{-1}		in metres*	in metres*		
0	0	0	<1	<1	Calm	-	-	0	Calm (glassy)
1	2	1	1-3	1-2	Light air	0.1	0.1	1	Calm (rippled)
2	5	3	4-6	2-3	Light breeze	0.2	0.3	2	Smooth (wavelets)
3	9	5	7-10	4-5	Gentle breeze	0.6	1.0	3	Slight
4	13	7	11-16	6-0	Moderate breeze	1.0	1.5	3-4	Slight - Moderate
5	19	10	17-21	9-11	Fresh breeze	2.0	2.5	4	Moderate
6	24	12	22-27	11-14	Strong breeze	3.0	4.0	5	Rough
7	30	15	28-33	14-17	Near gale	4.0	5.5	5-6	Rough-Very rough
8	37	19	34-40	17-21	Gale	5.5	7.5	6-7	Very rough - High
9	44	23	41-47	21-24	Strong gale*	7.0	10.0	7	High
10	52	27	48-55	25-28	Storm	9.0	12.5	8	Very High
11	60	31	56-63	29-32	Violent storm	11.5	16.0	8	Very High
12	-		64+	33+	Hurricane	14+	-	9	Phenomenal

The Beaufort Scale with more description of observable conditions on sea and on land:

BEAUFORT SCALE					
Beaufort Number	Name	Knots	MPH	Effects Observed Far From Land	Effects Observed On Land
0	Calm	Under 1	Under 1	Sea like mirror.	Calm; smoke rises vertically.
1	Light Air	1-3	1-3	Ripples with appearances of scales; no foam crests.	Direction of wind shown by smoke drift, but not by wind vanes.
2	Light Breeze	4-6	4-7	Small wavelets; crests of glassy appearance, not breaking.	Wind felt on face; leaves rustle; ordinary vane moved by wind.
3	Gentle Breeze	7-10	8-12	Large wavelets; crests begin to break; scattered whitecaps.	Leaves and small twigs in constant motion; wind extends light flag.
4	Moderate Breeze	11-16	13-18	Small waves, becoming longer; numerous whitecaps.	Raises dust and loose paper, small branches are moved.
5	Fresh Breeze	17-21	19-24	Moderate waves, taking longer form; many whitecaps; some spray.	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	Strong Breeze	22-27	25-31	Larger waves forming; whitecaps everywhere; more spray.	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	Near Gale	28-33	32-38	Sea heaps up; white foam from breaking waves begins to be blown in streaks.	Whole trees in motion; inconvenience felt in walking against the wind.
8	Gale	34-40	39-46	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks.	Breaks twigs off trees; generally impedes progress.
9	Strong Gale	41-47	47-54	High waves; sea begins to roll; dense streaks of foam; spray may reduce visibility.	Slight structural damage occurs (chimney pots and slate removed).
10	Storm	48-55	55-63	Very high waves with overhanging crests; sea takes white appearance as foam is blown in very dense streaks; rolling is heavy and visibility reduced.	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
11	Violent Storm	56-63	64-72	Exceptionally high waves; sea covered with white foam patches; visibility still more reduced.	Very rarely experienced; accompanied by widespread damage.
12	Hurricane	64 and over	73 and over	Air filled with foam; sea completely white with driving spray; visibility reduced.	

A pictorial interpretation of the Beaufort Scale:



5.2 Teaching in Surf

To be able to teach effectively in surf,

you must understand the ocean in all its complexity.

You must be able to survey a shoreline, either in person or by looking at a chart or satellite image and understand the processes that are underway; the movement of water and how that will alter with changes in tide height and weather.

There really is no substitute for familiarity with a location but often we do not have the luxury of long-term observation of the location we are teaching at. So being able to quickly identify features, hazards and safe areas to operate within and how they are likely to change throughout the day are key to a successful surf session.

Knowledge, understanding, experience and careful observation will enable an effective assessment of risk, the opportunity for learning and FUN!

Waves, Seas, Swell & Surf

Waves are generated by wind passing over the surface of the sea. If the waves propagate slower than the wind speed just above the waves, there is an energy transfer from the wind to the waves. Both air pressure differences between the upwind and the lee side of a wave crest, as well as friction on the water surface by the wind, causes the growth of the waves.

Wave height is determined by:

- Wind speed
- Distance of open water that the wind has blown over (called the *fetch*)
- Width of area affected by fetch
- Time duration the wind has blown over a given area
- Water depth

A given wind speed has a matching practical limit over which time or distance will not produce larger waves. When this limit has been reached, the sea is said to be "fully developed". In general, larger waves are more powerful but wave power is also determined by wave speed, wavelength (period), and water density. Oscillatory motion is highest at the surface and diminishes exponentially with depth.

Waves in the oceans can travel thousands of miles before reaching land. **Wind Waves** range in size from small ripples to huge waves over 30 meters high. When directly being generated and affected by the local winds, a wind wave system is called a **Wind Sea**. Wind waves in the ocean are called **Ocean Surface Waves**.

After the wind ceases to blow, wind waves are called **Swell**. A swell consists of wind generated waves that are not—or hardly—affected by the local wind at that time. They have been generated elsewhere, or some time ago.

The term **Seas** is used by Environment Canada for open ocean waves. Environment Canada uses the term **Waves** for open water waves on the Great Lakes.

The term **Seas** will also appear in NOAA forecasts and it has a specific definition:

Seas are the combination of both locally generated wind waves and distantly generated swell waves. Specifically, seas may be derived using the following formula where S is the height of the swell waves and W is the height of the wind waves.

$$\text{Seas} = \sqrt{(S^2 + W^2}$$

Waves in a given area typically have a range of heights. For weather reporting and for scientific analysis of wind wave statistics, their characteristic height over a period of time is usually expressed as **significant wave height**. This figure represents an average height of the highest one-third of the waves in a given time period (usually chosen somewhere in the range from 20 minutes to twelve hours), or in a specific wave or storm system. Given the variability of wave height, the largest individual waves are likely to be about twice the reported significant wave height for a particular day or storm.

It approximates the value an experienced observer would report if visually estimating sea height. When expressed as a range (e.g. seas 3-5 ft), this indicates a degree of uncertainty in the forecast and/or expected changing conditions (not that all waves are between 3-5 ft).

Generally, it is assumed that individual wave heights can be described using a Rayleigh distribution.

Example: *Significant Wave Height = 10 ft*

- 1 in 10 waves will be larger than 11 ft
- 1 in 100 waves will be larger than 16 ft
- 1 in 1000 waves will larger than 19 ft

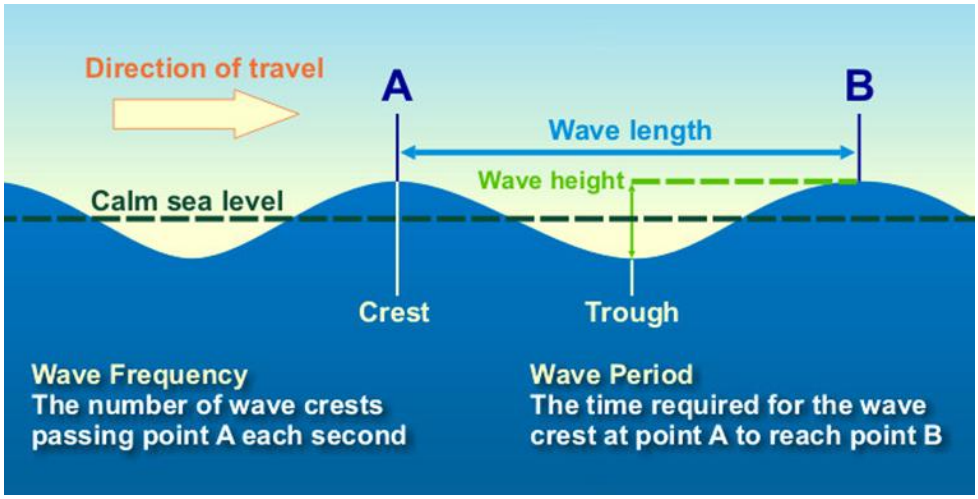
Therefore, assuming a wave period of 8 seconds, for a significant wave height of 10 feet, a wave 19 feet or higher will occur every 8,000 seconds (2.2 hours).

Wave heights increase dramatically as waves begin to "feel" the bottom near shore or any in shallow water. Wave / Current interaction will also dramatically impact wave heights such as in the area of the Gulf Stream or around jetties.

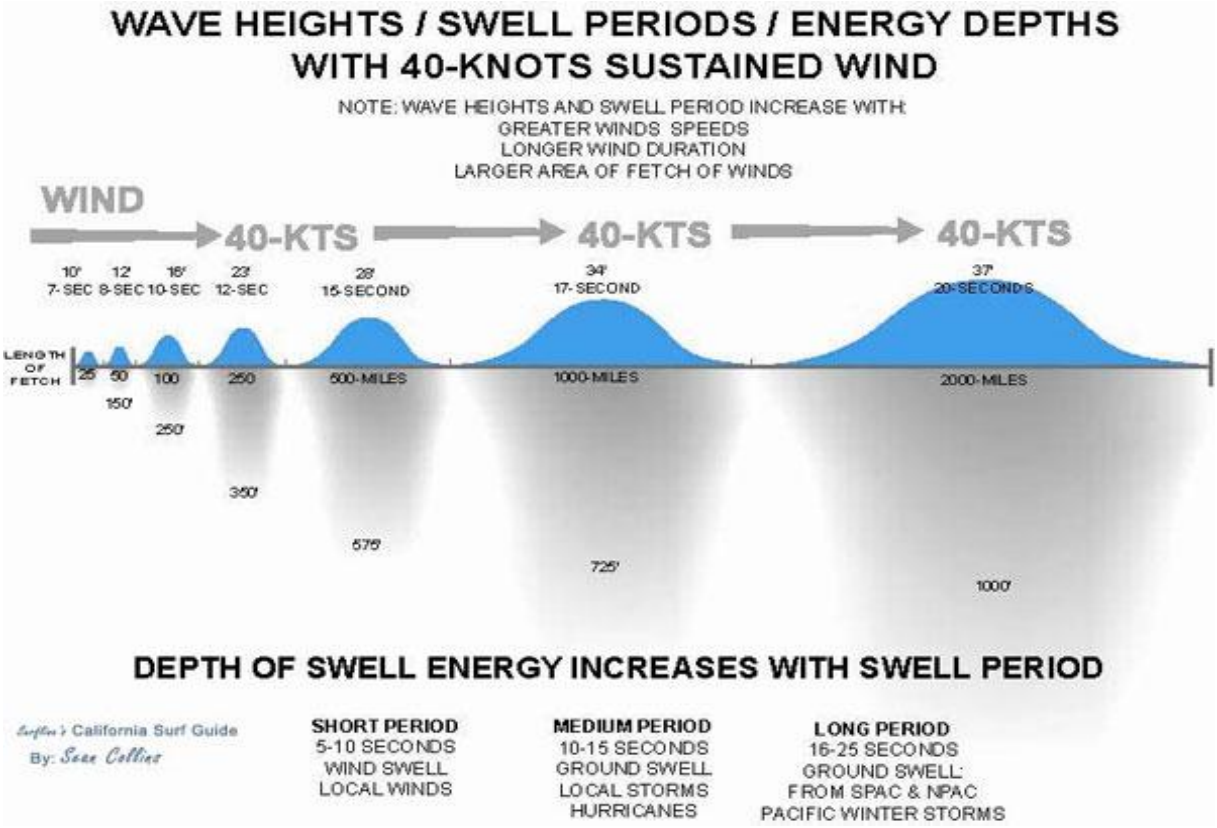
"The seventh wave of the seventh set" An old fisherman's tale? Perhaps, but it does serve to highlight that wave and surf conditions are not always constant. In open waters, the occasional wave may be twice that of the surrounding sea. There are occasional reports of "rogue" waves of an even greater ratio. Near shore waves are even less predictable. So-called "sneaker waves" are more likely to occur when several swell systems combine.

Waves are characterized by:

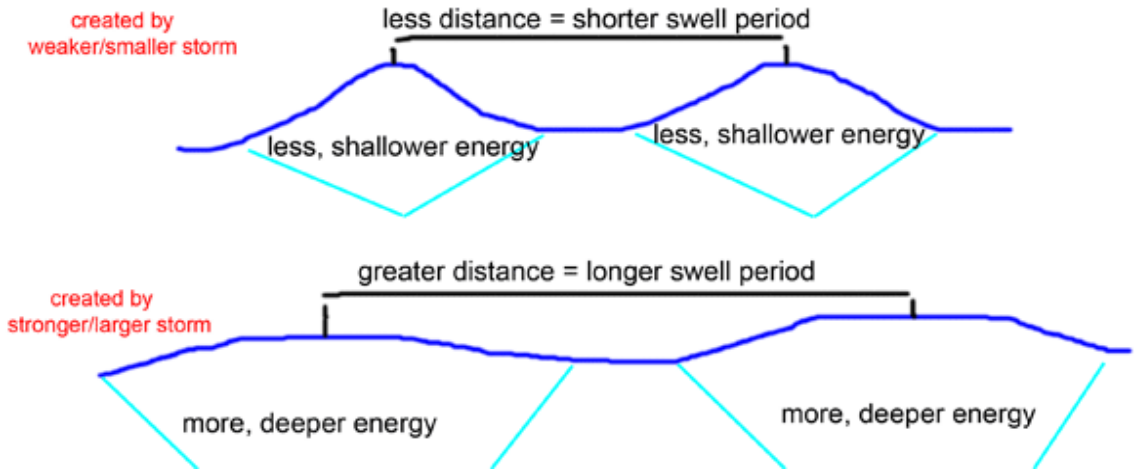
- Wave height (from trough to crest)
- Wavelength (from crest to crest)
- Wave period (time interval between arrival of consecutive crests at a stationary point)
- Wave propagation direction



The harder the wind blows (velocity), for the greatest duration (time), and over the longest distance (fetch), will create the largest waves as well as longer swell periods...



The more extreme the above-mentioned factors, the more energy is transferred deeper within the water column. As waves travel away from the source (storm), a factor known as wave decay will come into play. When waves travel a great distance, the longer period and deeper swell energy will be less affected by swell decay than the shorter period and shallower swells. Furthermore, over a great distance, these faster moving and deeper long period swells will arrive first.



Although a swell may be 3', if the period is long like 18-20 seconds+, you know there is much more energy below the surface. And when this 3' swell of 18sec feels the effects of bathymetry pushing this energy to the surface, the wave can amplify to 2-3 times the deep-water swell height (i.e. 6-9' surf). Whereas, a shallower 3' swell of say 9 seconds will roll in and break right around 3'. Bottom line, the bigger the swell height and longer the period, the bigger the resulting surf will be.

In deep waters, only wavelength and wave period affect a wave's speed. As the wave approaches shallow water, or water that is **half the wavelength or less** deep, the ocean floor begins to affect the wave's shape and speed. Wave height increases, and the crests become more peaked. As the steepness increases, the wave becomes unstable. The forward speed of the crest becomes faster than the speed of the wave, and the wave breaks. This typically happens in a water depth, **one and a half times the wave height**.

We typically describe breaking waves in three different ways:

- **Surging Breakers**
- **Plunging Breakers**
- **Spilling Breakers**.

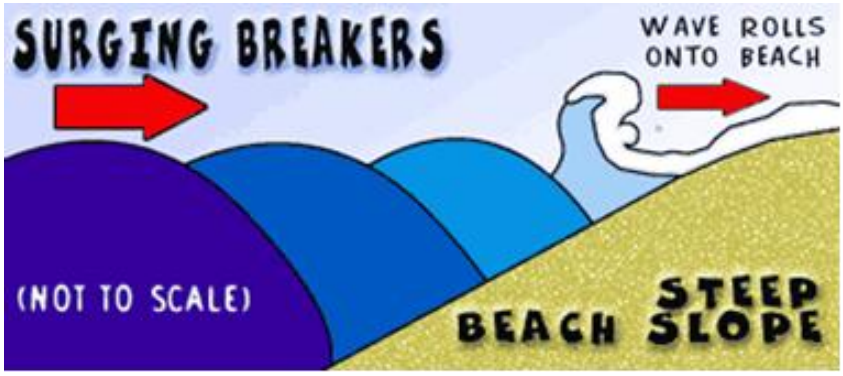
You may find all three wave types along a shoreline, within different areas or zones of the surf break, at the same time or at different times. This because the profile of a beach is not always consistent. The orientation of the beach to prevailing swell, the curvature or shape of the beach, headlands, offshore reefs, rocks, man-made structures, long shore currents, rip currents and river mouths will change the beach profile. Beaches also undergo seasonal changes.

Beach profiles typically get steeper during the stormier winter months as more destructive waves remove material. During calmer summer months the beach profile will even out as material is deposited back on the beach.

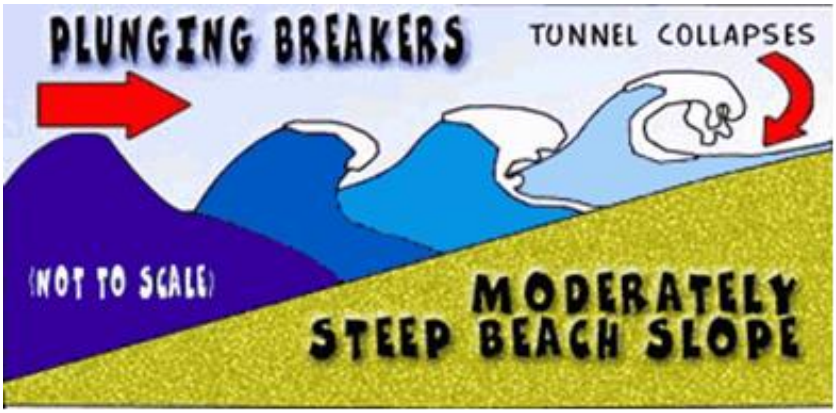
The most protected areas of the beach will have a more gradual profile, and this is typically where we will look to launch and land through surf. Just by studying a chart and having a sense of the prevailing swell direction, it is possible to determine where it may be possible to launch or land and areas that will likely present the most challenge.

Google Earth is an incredibly valuable resource and while the images do represent just a snapshot in time, they can help to confirm what you might expect to see from studying charts and weather maps. Google Images is building an impressive library of photographs of even surprisingly remote locations and can also add to your information about a specific location.

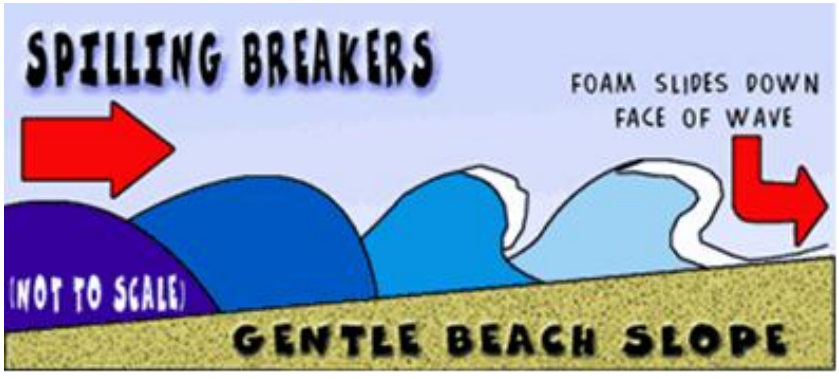
Surging Breakers happen on beaches where the slope is very steep. The wave does not actually break. Instead, it rolls onto the steep beach. These kinds of breakers are known for their destructive nature because little of the energy is dissipated before it reaches land.



Plunging Breakers happen on beaches where the slope is moderately steep. This kind of wave normally curls over forming a tunnel until the wave breaks. A powerful release of energy and air may shoot water up into the air or horizontally. Expert surfers love this type of wave!



Spilling Breakers happen on gently sloping beaches. The crest of the wave crumbles and the wave's energy is gradually released. There waves breakers are typically constructive in nature and are the friendliest waves to surf in a sea kayak.



For more information on wave types see this online Slide Show

WAVE SETS
Surf waves come in sets and during a large set you may have plunging breakers on offshore sandbanks and between sets have spilling breakers in the same area or zone. The more energy that reaches the beach, the more problematic it can be to launch and land through the surf. Timing is everything in the surf!

Long period swell from distant storm systems is characterized by sets and lulls. The duration or number of waves in each set will vary, as will the duration of the lulls. But by prolonged and careful observation you can determine the rhythm of a particular day. Experienced surfers always seem to catch the best waves and rarely get caught inside. Are they using the seven-wave theory?

According to Fabrice Veron, the director of physical ocean science and engineering at the University of Delaware, long period swells will commonly arrive in groups of 12 to 16 waves. That range, coupled with the tendency of wave groups to bundle their tallest waves in the center of the pack, provides a possible basis for the seven-wave claim.

Veron offered this explanation: A group will 'modulate' the wave amplitude; it's like another long wave on top. So, the first wave in a group is tiny, the next one is bigger and so on until you get the biggest one in the middle of the group. Then they get smaller again. The last one is tiny, so the biggest wave in the group is in the middle, and if there are 14 waves in a group, the seventh wave is the biggest.

THE ANATOMY OF THE SURF ZONE

There are four distinct zones within a surf break:

1. Swash / Backwash
2. Soup Zone
3. Impact Zone
4. Out-the-back (Safe Zone)

While distinct in character, they can be fickle, constantly changing both in terms of location and their effect.

SWASH / BACK WASH
This describes the surge of water up a beach and back into the ocean. The rhythm is determined by the period of the waves and the reach and push of the swash and the pulling power of the backwash can change dramatically during sets and lulls and at different stages of the tide. The swash and backwash rarely move exactly perpendicular to the shoreline but will have some lateral component. This can prove frustrating, turning your kayak sideways as you try to launch. Careful examination of the beach will likely reveal peaks and troughs in the beach profile. By positioning your kayak either at the peak or the trough, you can minimize the degree

of lateral movement. These may be hard to see on gently sloping beaches but quite pronounced on beaches with steeper profiles.

On steep beaches with plunging waves close to shore (sometimes called ‘dumping’ waves) the swash and backwash can be problematic, even dangerous, dragging the unwary into a ‘washing machine’ recirculation that can be difficult to extricate from. Launching and landing requires careful timing and teamwork.

On exposed surf beaches, the swash can be powerful, and the backwash will retreat towards a rip current. We can use this backwash to help identify and then utilize the assistance of the **rip current** to transit through the Soup zone.

SOUP ZONE
The Soup Zone is a characterized by tumbling walls of whitewater often called foam piles, that will slowly dissipate in energy as they make their way up the beach. The soup zone is a relatively safe area to hang out if you remain perpendicular to the waves and you monitor your drift. Within the soup zone water will move laterally towards the rip current which can be helpful or dangerous depending on the size of the surf.

During large swell, the tumbling waves within the soup zone may reform to produce another impact zone or beach dump close to shore.

IMPACT ZONE
The impact zone is the most hazardous area within a surf break where swells finally topple over and release massive amounts of energy. The impact zone is not a fixed point but will move in and out as sets of waves and lulls come and go. It can be easy to assume you are safely outside the impact zone only to discover that waves are breaking much further offshore.

OUT-THE-BACK (SAFE ZONE)
The gathering point for a group of paddlers negotiating the surf zone, the Safe Zone is outside the area for potentially breaking waves. This may be several hundred yards offshore if the swell is large and the beach profile is gradually sloping. Communication with those on shore may only be possible using VHF marine radio. The Safe Zone may be just a few yards offshore on beaches with a steep profile.

The width of the Surf Zone (the distance between the beach and the safe zone) will determine the strategy you use as a leader/instructor. It may be possible to teach from shore if the surf zone is narrow. A wider surf zone will require you to be on the water. If you are unable to maneuver within the surf zone with total control, you will be unable to teach effectively in the surf zone.

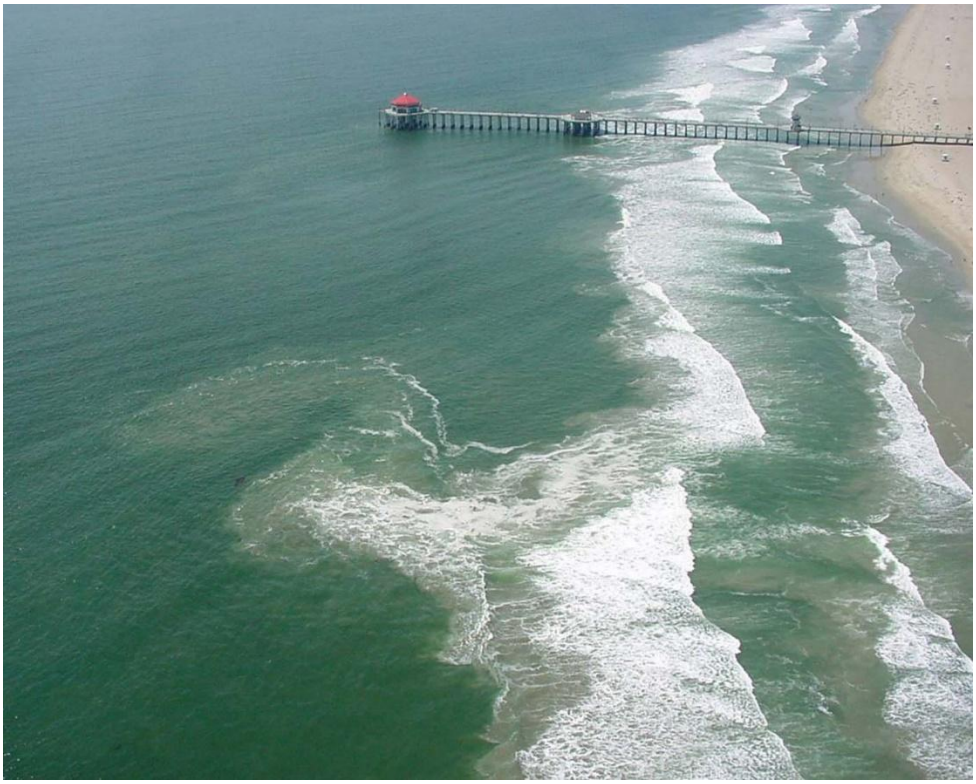
COASTAL CURRENTS

Sometimes currents occur along the coast and only affect small areas. One current found along the coast is the **Longshore Current**. This current is caused when waves strike the beach at an angle. The front part of the wave hits the shallow water first and slows down. The rest of the wave bends as it comes onto the shore creating a current that parallels the beach. Larger waves, create stronger Longshore currents. In areas where Longshore currents often occur, sandbars form.

Rip Currents are a potentially dangerous effect of Longshore currents. Rip currents, sometimes incorrectly called **rip tides**, can happen when Longshore currents, which move parallel to the beach, bounce seaward because of a change in the bottom's structure. Breaks in sandbars are also optimal places for rips to happen. Swimmers need to be careful in areas where rips can occur. A swimmer can be carried out to sea with this flow of water. Swimmers caught in this current should swim parallel to the shore until they are out of the rip current. Then, they can swim safely to shore.

Rip currents can be dangerous, but they can also help us transit the surf zone. The Soup Zone will be repressed or even non-existent in a rip current. Even the waves breaking in the Impact Zone may be smaller than elsewhere in the Surf Zone. That said, those waves that do break in the area of the rip current may well be steeper than elsewhere and break with considerable force.

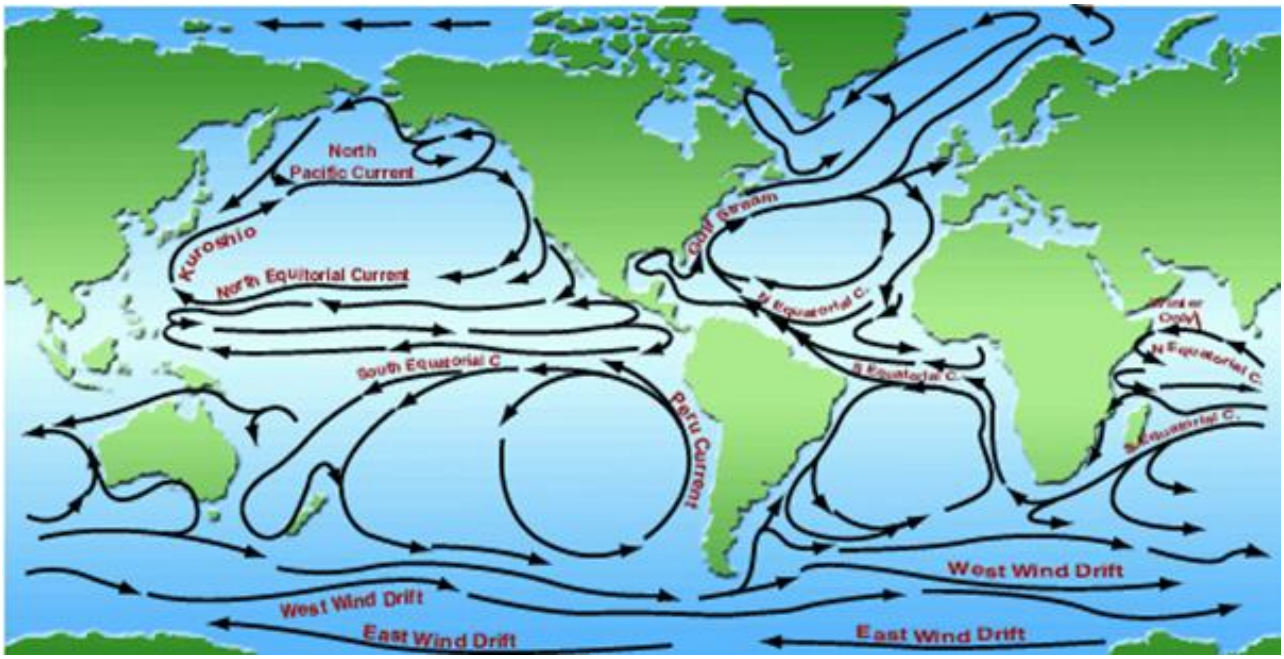
Visual clues to the presence of a rip current will include discolored water (rip currents scour the sea floor and transport sand offshore), consistently smaller waves close to shore, areas of surface foam further offshore than normal, and areas of ripples or textured water on an otherwise ‘glassy’ sea surface.



One type of vertical current is called a coastal **upwelling**. Winds blowing offshore (or toward the ocean) push water away from the shore. Deep, colder water rises to replace the water that has been blown out into the ocean. This cold water from deep off the ocean floor brings many nutrients to the surface. Why do you think this water has so many nutrients? Dying organisms and fecal matter fall to the ocean floor. As these decompose (rot), nutrients are released, but few organisms are there to use the nutrients. They remain trapped on the ocean floor until an upwelling pushes them to the surface. Plankton blooms usually follow coastal upwellings because of the abundant nutrients that come with it.

Downwelling is another coastal happening. Onshore winds (or winds blowing toward the shore) push water toward the coast. This drives the nearshore surface water down and away from the coast.

OCEAN CURRENTS



Ocean currents are slow-moving and have little direct impact on us as sea kayakers but they do have a significant impact on the weather and the water temperature.

TEACHING STRATEGIES FOR THE SURF ZONE

Teaching in the Surf Zone can be extremely challenging, exhausting, but also a lot of fun. It is important to design a session that meets the needs of your students that has a logical progression. The problem is, as soon as your student leaves the beach, they are potentially immediately in a high energy, dynamic and potentially high-risk environment.

Choice of venue is likely the most critical decision you will make for the success of the session.

- Look for a gradually sloping beach with spilling waves and a wide soup zone.
- Breaking waves greater than 3 feet will likely prove too challenging for novices.
- Look for potential hazards, and consider how these will change with tide height.
- Beware of offshore winds and strong rip currents – you want to be sure that any swimmers are able to return safely to shore.

Four Rules of the Surf Zone

COURTESY OF ROGER SCHUMANN, L5 AOWCK ITE

The Four Rules of the Surf Zone is a way to brief and then remind students of four important aspects of safety:

1. Stay ocean-side of your boat
2. Two hands on the paddle
3. If you tip, tuck!
4. Maintain four boat-lengths of separation

Ensure your students know the rules by holding up 1 to 4 fingers and have your students repeat the rule. Then create some hand and body signals to represent each rule. See VIDEO.

Draw a penalty box on the sand. Students who break the one rule get a warning; two rules, they have to get out of their kayak and stand in the penalty box; three rules, they have to stand in the penalty box for 1 minute; four rules, they have to stand in the penalty box for five minutes.

This can all be made lighthearted, but helps to emphasize these golden rules.

Surf Zone Progression

- Surf Zone environment, safety, etiquette & communication
- Bracing & Edging
- Holding position & moving laterally in Soup Zone
- Bracing & Side Surfing
- Launching & Landing
- Positioning, Catching & Surfing waves
- Diagonal Runs
- Changing direction on the wave
- Recovery from a broach
- Rescue techniques

Discussion on surf zone environment, safety & communication

1. Identify and describe the swash/backwash, soup zone, impact zone, out-the-back.
2. Identify rip currents and any other hazards.
3. Introduce Four Rules of Surf Zone.
4. Introduce surf zone etiquette.
5. Agree on paddle signals and other methods of communication.

Bracing & Edging

1. Demonstrate safe & effective bracing technique – low brace & high brace
2. Edge versus lean (many capsizes occur because the student is leaning onto the brace and capsize occurs as the wave passes under the kayak)
3. Keep hands below shoulder height at all times.

Holding position & moving laterally in Soup Zone

1. Working with students one at a time, assist them to launch and walk into the water with them.
2. Hold their kayak by the deck-lines (wearing gloves is a good idea) and help them hold position with their bow facing on coming waves – let go of them when they are ready to do it on their own.
3. Spin them 180 degrees and help them hold position with their stern facing oncoming waves – let go of them when they are ready to do it on their own.

Bracing & Side Surfing

1. Hold their kayak by the deck-lines (wearing gloves is a good idea) and position them parallel to oncoming waves.
2. Help them brace onto waves and prevent them from side surfing by laying on their boat and dragging your body in the water – stay ocean side of their kayak!

3. When they are ready, allow them to side surf.
4. Switch sides and repeat.

Launching & Landing

1. This is where having two instructors is really helpful!
2. If working alone, decide if you are most useful in or out of your kayak – it will likely depend on the size of the surf, the distance to the safe zone out-the-back and the skill and confidence level of your students.
3. Demonstrate launching – punching through waves by spearing the wave face and grabbing water on the backside of the wave, show commitment and a high cadence until well into the safe zone out-the-back.
4. Demonstrate both methods of landing – top/back of wave, deliberate broach and side surf.
5. Set angle to broach on strong side, away from hazards.

Positioning, Catching & Surfing Waves

1. Identify area for take-off – look for area of foam created by previous wave of set of waves.
2. Position just to the outside or to the side of the area of foam.
3. The wave does not need to be too steep – otherwise a broach is almost unavoidable.
4. Be patient – wait for a set, or wait for a lull depending on the level of energy desired.
5. Wait for the wave – don't paddle too early, only for the wave to break behind you.
6. Paddle aggressively to match the speed of the wave.
7. Do not lean forward or back – this does little, if anything to adjust the trim of the kayak and compromises good technique.
8. Before catching the wave, survey the area – is someone else paddling for, or already surfing the same wave? Is there anyone in your fall-line – the path you are about to take once you have caught the wave? If so, do NOT catch that wave but wait for another.

Diagonal Runs

1. As you are catching the wave, decide if the wave will break right or left. We want to surf the green face, away from the breaking wave towards the shoulder.
2. If we surf straight our speed it limited to that of the wave. If we surf diagonally, "down the line", our speed is almost limitless.
3. The wave will be pushing against the stern of your kayak, trying to turn you off the back of the wave. Use a stern rudder (pry) on the down wave (beach) side to hold the kayak straight as you surf down-the-line.

Changing Direction

1. If the wave is steep and close to breaking it is almost impossible to change direction and any attempt may result in a capsize or pitchpole.

2. For a change in direction to be possible it is necessary to release both the bow and stern of the kayak. By changing the blade angle, a stern rudder can become more of a braking stroke. This will help to slow the kayak and bring it up the wave face, releasing the bow from the trough of the wave, and releasing the stern from the top of the wave. At this point in time the stern rudder needs to morph into a low brace turn (on the same side), with aggressive edge towards the working blade.
3. As the kayak turns and begins a diagonal run in the other direction, a switch to a stern rudder on the other (down-wave) side will be necessary to maintain control.

Recovery from a broach

Some broaches are unavoidable, and it will only be possible to recover from it once the wave has broken and some of the energy of the wave has dissipated.

1. An aggressive lean onto a high brace, putting the kayak on its side may allow the wave to pass underneath. It is a high-risk technique as it is likely that the hands will rise above the shoulders as you do so, exposing them the shoulders to injury.
2. Once in a side surf, try generating forward momentum by doing a series of half brace/half forward stroke. This will help you to climb up and over the foam pile.
3. As the foam pile dissipates, an aggressive reverse sweep with a lot of edge on the down-wave side, may be enough to slow the kayak down and lift it up onto the foam pile and bring it around straight towards the beach.
4. An extremely aggressive method to recover from a broach and exit off the wave is to deliberately capsize on the down-wave side. The force of the water against your body may be enough to allow the foam pile of the wave to pass over the top of the upturned hull of your kayak. Your body will likely be forced onto your back deck, so a back deck or rodeo roll will be the best method for bringing you back upright. This method should NOT be tried in shallow water as serious injury may result.

Rescue Techniques

Just like in all other environments, personal safety and the safety of the group needs to come before that of the swimmer.

- Swimmers should be verbally encouraged to be active in their own rescue by hanging to their kayak and paddle, staying in the ocean side, leaving the kayak upside down and swimming aggressively and allowing themselves to be dragged shore-wards.
- Should the swimmer let go of the kayak, or be caught in a rip, then consideration can be given to offering physical assistance.
- A back-deck carry is an essential skill that needs to be practiced. It is typically the fastest way to get a swimmer to shore but requires good bracing skills on the part of the rescuer.
- While towlines can be problematic in the surf zone and cause entanglement, in some instances a tow may be a good option:

    - Hook a short tow (approx. 15ft) to one end of the shaft of the swimmer's paddle; have the swimmer hold onto the other end.
    - Hook a short tow to the deck-line at the bow of the swimmer's kayak to tow it to shore.

  In both instances, paddle in at an angle to ensure the either the swimmer or the empty kayak does not get surfed into you and you paddle towards shore.
- Sometimes the best/quickest option is for the swimmer and/or rescuer to make their way out through the surf to complete the rescue out-the-back. Determine the path of least resistance and go with the flow, so long as the flow isn't taking you towards a hazard.

Teaching in the surf zone can be extremely tiring. Manage your own energy levels and those of your students. Take frequent breaks. Consider half-day classes. Water, air temperature and wind chill can be significant factors in the quality of learning that takes place. Ear plugs, nose plugs and skull caps can really help improve comfort levels and reduce nausea caused by cold water contact. A group shelter/bothy can be a fun way to warm up while having lunch.

Build confidence with baby steps. Remember, you want them to have fun and come back for more!

5.3 Teaching in Rock Gardens

The popularity of rock garden paddling seems to be unabated with manufacturers designing shorter, more playful sea kayak designs with safety features more akin to whitewater kayaks and organizations like the ACA creating specific skills classes to meet the demand.

While not everyone's cup-of-tea and not readily accessible for many on the central and south-east coast of the USA, there are enough folks rock gardening world-wide that this topic is worthy of inclusion in this manual.

Rock gardens are the most hazardous environment that we teach in as coastal kayak instructors and there is specific equipment, techniques and terminology used.

Before looking at specific teaching strategies it is necessary to understand, what is rock gardening?

ROCK GARDEN SKILLS, SAFETY & RESCUE

Sean Morley, ACA L5 AOWCK Instructor, L4 OWCK IT

From an article published in Ocean Paddler magazine.

In the U.K. you call it *Rock-Hopping*. In California we call it *Rock-Gardening*. Down under they call it *Running-the-Gauntlet*. I call it fun!

Playing in the surf on a sandy beach is certainly fun but playing in the intertidal zone, where the bedrock has stubbornly resisted the ocean's advances and cliffs have been carved over the millennia into structures more beautiful than anything man has created is something else entirely. Dancing and weaving between the rocks in a kayak is a fusion of sea kayaking, surfing, and whitewater. The powerful surge created by an ocean swell can turn a tranquil rock pool into a Class 5 cauldron, bare rock into a cascade of white that is as brief as it is beautiful. I have taken solid Class V whitewater boaters into ocean rock gardens and they have been challenged by the constantly changing, confusingly random and apparently unpredictable nature of the ocean's version of a cascade.

Mastering moves such as the pour-over, exploring deep into sea caves, and running slots no wider than your kayak requires solid boat control skills but also demands an understanding of this uniquely dynamic environment. Dabbling so close to the impact zone is inherently risky but by recognizing the hazards and fully taking into consideration the factors that influence the degree of danger, you can manage the risk and bring it within acceptable parameters.

The three principle factors that govern our ability to play in the rock gardens are SWELL, TIDE (height), and WEATHER.

SWELL

Swell is the rhythmic beat that controls the dance that we perform amongst the rocks. Propagated from distant storms, wave trains spread out like the ripples on a pond after a rock has been dropped - the more powerful the storm the bigger the rock. When these waves eventually begin to interact with the shoreline, they rise like magic, bending and twisting, lifting us up, over and through the intricate pattern of rock features that adorn our coastlines. Their final act is to burst into a cacophony of light and sound that is both beautiful and terrifying and never to be repeated as the white foam recedes, then dissipates, releasing its grip on us, at least for a moment.

The period and height of swell will determine which areas are safe for us to enter. The period of swell is an indicator of the amount of energy; the speed and the volume that each swell has. The longer the period, the taller and more powerful the resultant breaking wave will be and perhaps more crucially, the greater the surge of water and corresponding backwash, turning

rock shelves into cascades, caves into boiling cauldrons and slots and tunnels into torrents. But the speed of a long period swell is easier to judge and will give you more time to get through or over a feature. Short period swell is more chaotic, harder to judge and requires immaculate timing to negotiate a feature. Add in some wind waves - really short period waves created by local winds - and the ocean becomes a mess of clapotis that disguises the swell and makes timing your ride even more challenging.

The height of swell it obviously a factor and more often it is the trough of the wave that presents more of a hazard, exposing rock that can leave you perched high and dry, a sitting duck for the next wave crest.

Swell reports from buoys located offshore normally give the **dominant** wave height and period. But everyone needs to be on the lookout for so called 'rogue waves' and the familiar shout of "Outside" is used to inform the group of an approaching wave much larger than the rest. There is often more potential for rogue waves when there are swells approaching from two directions. For example, here on the California Coast in summer a typical short period northwesterly swell of 5' @ 10seconds produced by a weather system situated in the Gulf of Alaska may combine with a long period southwesterly swell of 2' @ 18 seconds produced by a storm system in the South Pacific. When the peaks and troughs of these swells synchronize there is the potential for waves significantly larger than the dominant wave.

Waves tend to arrive in sets, particularly during long period swell. It is important to get a feel for the rhythm of the ocean that day. How long do you have between sets? If the ocean has become quiet, you should not be relaxing. Instead you should be anticipating the next set that is almost inevitably on its way. How many waves are in a set? Just one of the ocean's many secrets!

TIDE

The height of the tide will determine what features are exposed, which caves and arches it is possible to enter and what beaches will be available for landing. It will also influence the size and nature of the waves within the rock gardens. What is the trend? Is it getting deeper or shallower? Often you will find more protection at low tide but the waves that do enter the feature will have broken or be much more likely to break due to the reduced depth. A lower tide will expose mussel beds and barnacles that present a real hazard to bodies and clothing. NEVER use hands to fend off rocks. Use your paddle or let the boat take the impact. The mussel beds make for a soft landing for a kayak. Add a little bit of kelp and you can slide over features that look unmake able. But try not to cause damage - look out for star fish and sea urchins that will not appreciate getting crushed by your kayak.

WEATHER

As with any aspect of coastal kayaking, weather plays a key role in determining when it is safe to paddle. Water and air temperature will influence survival times in an immersion situation,

reduced visibility will influence the success of any search and rescue operation, wind speed and direction will influence the surface water conditions, comfort, energy levels and speed of the group and the ability to communicate orally. What is the weather trend for the day/the next day? By entering the rocks, you are deliberately raising the stakes. Make sure that the weather isn't going to turn a fun outing into a trial of endurance or worse.

Team Work

Working the features along a rocky coastline with an experienced group of paddlers is like an unrehearsed dance choreographed using the C. L. A. P. mnemonic. Before considering playing amongst the rocks you need to have a clear understanding of CLAP to ensure every member of the group is aware of their responsibilities.

C – Communication

It is vital that everyone understands the voice, hand and paddle signals that will be used, exactly what a whistle blast means (look at me!) and the working VHF radio channel should the group become separated. Very often voice communication will become impossible within the rock gardens and we will only communicate by hand or paddle signals. When you get to know your paddling buddies, you will find that a remarkable level of communication can be achieved without speech.

L – Line of Sight

A key principle when negotiating rock gardens as a group is to maintain a chain of line of sight with everyone in the group through any hazard. You will not be able to see everyone at all times, so it is incumbent upon ALL members of the group to be aware of their responsibility to be a link in the chain. Hand and paddle signals are useless if they cannot be seen. In a rescue situation it is not necessary for everyone to see what is happening and get involved. Instead the group can position for safety in deep water and maintain line of sight to observe, placing the fewest number of paddlers necessary in the hazardous zone.

A – Awareness

Obviously, the safest route around a rock feature is to avoid the hazard entirely. We are intentionally exposing ourselves to hazards by entering rock gardens but before we do so it is important that we recognize and understand the risks that are presented by doing so. Bumps and scrapes are to be expected when playing in the rocks. Identifying hazards of a more serious nature are crucial if we are going to keep the risks within acceptable margins. Tunnels to no-where (especially those exposed only when a wave recedes), crevices that might jam a boat or body and submerged rock shelves that can trip up a swell and produce a sudden and violent lateral movement of whitewater should all be avoided. Awareness includes a constant scanning of the environment, including looking out to sea for incoming swells and scanning well ahead for rocks and breaking waves that only appear on large sets. Awareness also relates to the other boaters in the group, being aware of their skills and abilities; their capability to provide support or likelihood of needing rescue. Finally, awareness includes an accurate assessment of

your own ability. Don't be reliant on others to rescue you because of your own inexperience, lack of skills or poor judgment - leave your ego on shore!

P – Position
When negotiating a feature, you should be constantly thinking your position in relation to the group, both to maintain 'Line of Sight' and to be in a 'position of most usefulness'. This might be providing safety cover: positioned so that you can perform a bow rescue should one of your colleagues capsize, or to block the path to a crevice or other hazard that you might have observed, and others might be unaware of. You also need to be in position to tackle the feature when it is your turn. This allows the group to progress at an appropriate speed through features and not spend too much time sitting around waiting – a recipe for sea sickness. Once through the feature you should position to provide safety cover or just maintain line of sight in deep water until everyone in the group has passed through the feature.

Gear
Check your gear is appropriate for teaching rock gardening.
Things to consider are:
1. Dress for immersion but also to protect you from rocks and the organisms that live on them.
2. Helmets? A no-brainer! Gloves? Not a bad idea. Cheap gardening gloves work well. Body armor? May be.
3. Tow system - short tows (approximately 15 feet) work well in the rocks, and highlight the necessity for any tow system whether long or short to have a quick release.
4. Keep decks as clean as possible but at the same time be able to access everything you need from the cockpit.
5. Pros and cons of placement of spare paddles.
6. Identify any entanglement hazards on kayaks (end toggle loops, etc.) and on life jackets.
7. Can you repair a damaged kayak or take care of a damaged body?

The "OUTSIDE" Drill
have your students practice the "OUTSIDE" drill. Surfers and kayakers have adopted the call "OUTSIDE" to warn others of an unusually large wave that is approaching.

Have students paddle parallel to shore and call "OUTSIDE". Observe their response.

Students should repeat the call "OUTSIDE" and, at the very least, look at the oncoming wave. Have students determine what strokes they would use to turn their kayaks quickly, maintain or generate some momentum, and then accelerate towards the oncoming wave. Have them consider the sequence of strokes and whether it is necessary to face the oncoming wave or perhaps, if they are facing the shore, paddle backwards towards the oncoming wave.

This activity can be used at the start of a class to assess the skills of your students.
Scenarios & Skills

Playing amongst the rocks safely requires practice of some important skills:

Combat Roll

How reliable is your roll? What about your off-side? Can you reach and roll up with your spare? Consider practicing an extended roll as your go-to method should your first regular roll fail. The aerated water in amongst the rocks provides less support for the paddle and the increased leverage of the extended roll will increase your chances of a successful roll. For obvious reasons having a 'bomb-proof' roll is the key to pushing hard in amongst the rocks. If you are the one that is always swimming, consider if you are paddling beyond your current ability. Solidify your skills and build your confidence in a less consequential environment such as the surf zone before getting back into the rocks.

Swimming

We are all between swims. The Tsunami Rangers, wave warriors and pioneers of rock gardening in Northern California go by the rule; "never paddle into somewhere you are not able to swim out of". Good advice! Practice swimming with your boat and paddle, just with your paddle and then take those skills into surge found within the rocks. Find a realistic location where you can practice landing and re-launching by swimming with your kayak using your short tow line.

If you find yourself capsized and out of your boat:

1. Be an active swimmer! Participate in your own rescue. Flip your boat upright. An upright boat is much easier to swim with and for a rescuer to deal with. Consider whether giving it a good shove will send it outside of the impact zone. Is there someone to collect it before it drifts too far?
2. If shoving your kayak in not a good idea, work your way to the bow of your upright kayak. Grab hold of the end toggle and your paddle (by the joint of the paddle shaft and blade) and start swimming towards deep water. Be mindful of the way the water is moving through the feature. Don't fight it unless it is taking you towards danger. Go with the flow!

Rescues

It is not hard to imagine the following scenarios occurring in the rocks:

- Injured kayaker/swimmer recovery from cave or rocks
- Damaged and flooded kayak
- Unconscious kayaker/swimmer

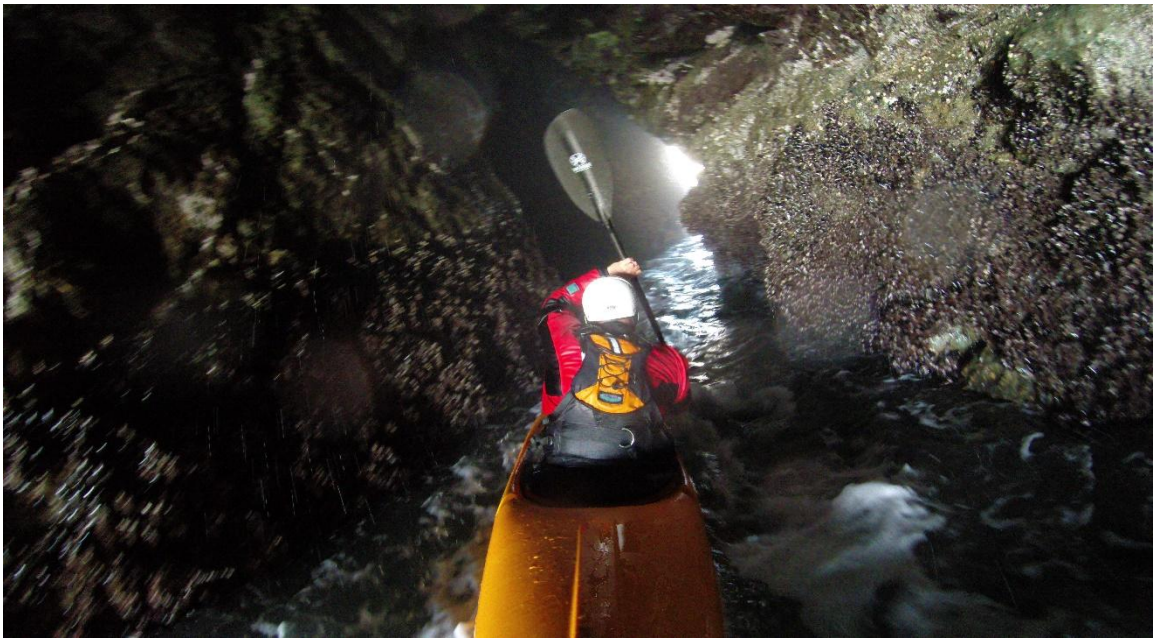
Find a suitable location where the consequences are low and practice.

Towing

Imagine a member of your group has capsized and is swimming with his or her kayak perilously close to the rocks within the impact zone. Before you can begin an assisted rescue, you must create a safety margin. You have a matter of seconds to tow your colleague away from danger. How quickly can you get hooked on and underway? Should you even hook on? What are the alternatives?

We have found that the following strategies work well in amongst the rocks:

- For most situations, presenting your bow or stern toggle to the swimmer if they are holding on to their kayak and throwing down a few powerful forward or reverse strokes will be enough to pull that person away from danger.
- Only hook on if you need to move the kayak (and swimmer) a considerable distance. It is often best to tow the kayak and (stern deck) carry the swimmer separately if you need to move them a significant distance to safe water.
- To recover an unoccupied kayak or even a kayaker without a paddle consider using the 'Javelin Technique'; a method of shoving a free-floating kayak using your own kayak to guide its direction. Come in 'HOT' and transfer your momentum to the other kayak. With practice you can move even a waterlogged occupied kayak a considerable distance quickly and efficiently.
- Practice quick-releasing your tow system. Can you do it with gloves on? Can you do it with gloves on and upside down. Can you do it with gloves on, upside down whilst being pulled backwards towards the rocks? Imagine getting caught inside whilst towing. That is not an unrealistic situation!



Strokes

Rock gardens are the perfect place to utilize a range of strokes from the elegant side slip (hanging draw) to the powerful high brace turn. But consider the effect that each stroke has on your speed and momentum. In many circumstances, carrying some forward speed through the feature will ensure you pass through with style and grace. Avoid braking strokes unless you are riding a surge and need to kill your speed to make a turn or to avoid a collision. Forward sweeps whilst maintaining plenty of edge by using a low brace recovery will ensure you have lots of momentum. Make sure you initiate a bow rudder or braced turn with an effective forward sweep to carry momentum through the turn. Learn to paddle backwards with control - and an essential skill for backing into caves. A powerful forward stroke is the key to running pour-overs. You need to accelerate to match the speed of the surge in a just a few strokes. A fairly short paddle with a wider 'Euro' blade shape would seem to be more effective than longer paddle with a narrow, 'Greenland' style blade shape.

Environmental Considerations

We are not the only ones who enjoy the rock gardens. Indeed, many species call it home. We need to respect the fact that we are playing in their backyard. It is all too easy to ignore the basic rules with the adrenalin rushing through your arteries. Consider how appropriate it is to even go there at certain times of year; for example, during sea bird nesting season or whilst the seals are pupping. It is certainly the case here on the coast of California that more and more highly sensitive areas are going to be permanently closed to boaters if we ignore the undeniable impact our presence has on pinnipeds, otters and sea birds. It is incumbent upon us to behave responsibly, both out of respect for the wildlife and for the future of the sport we love.

MASTERING THE POUR-OVER

What, you may ask, is a pour-over? The short answer is “riding a wave over a rock”. I’m going to give you a longer version of the answer however and seek to de-mystify this apparently dangerous and flamboyant maneuver that combines the thrills of sea, surf and whitewater kayaking in a fusion of judgment, timing and skill.

Why, you may ask, would you want to ride a wave over a rock? Well to be frank, if you have to ask the question, this might not be a maneuver you would wish to add to your repertoire. But to the reader that thinks it might be something you would want to do let me say that it is perhaps the most dramatic, exciting and satisfyingly fun ‘stunt’ that you can pull in a rock garden. Does it have any practical application? Absolutely! You use the same judgment, timing and skills to perform a surf landing on a beach or a (last resort) seal landing on a rock. Master the pour-over and a surf landing becomes child’s play.

Perhaps it is because I come from the old school of kayaking when the idea was to miss the rocks, but I have been a little alarmed at the antics of some ‘new age’ boaters who seem to think that stuffing your boat on the rocks is all part of the fun. I learned to paddle both on rivers

and on the sea in 13ft fiberglass general purpose kayaks. If we hit a rock it often meant the end of the trip or at the very least yet another field repair patch. With the arrival of roto-molded plastic kayaks hitting rocks is no longer terminal and on the river, this has enabled a whole new genre of boating. The Tsunami Rangers have certainly helped encourage the new breed of aggressive rock garden thrill seekers but remember that the TR boats are fiberglass and whilst they certainly took paddling in rock gardens to a new level, they also developed the judgment, timing and skill to keep their craft sufficiently together to get them home. Don't let the fact that your plastic sea kayak will take a good beating cause you to neglect learning how to avoid the rocks. To be blunt, if you attempt a pour-over and end up stuck on a rock, you've screwed up. Yes, it has happened to me many times and it might be one of the more hilarious moments of the day, but it could also end badly so take the time to learn how get it right.

Let's break it down:

JUDGMENT
Can judgment be taught? Perhaps…It can certainly be learned from trial and error on a sliding scale of risk. Good judgment begins with an understanding of risk factors and from knowledge of your environment.

- Risk Factors:

When is a feature unsafe? You need to spend time looking at it. If you cannot control your speed and end up surfing in front of the wave, where will you end up? Avoid features that lead to a dead end (no pun intended!) Stay away from crevices, caves that narrow down to less than a boat's width, or jumbles of rocks that offer no escape should you end up on them. Watch what happens when the wave recedes. Are there any nasty rock spikes exposed that could pin a kayak? Does a deep pit appear that could swallow or jamb a kayak? Can you see large barnacles or mussels that could shred gel coat, plastic or even skin?

- Knowledge of your environment:

Research the conditions you are likely to face such as: wind (speed and fetch), swell (direction, height and period), tidal movements (vertical and horizontal). Understanding how these varying conditions will impact your ability to play within the rock gardens safely is the key.
What are the ideal conditions for mastering the pour-over? A fairly long period swell that is consistent in direction and low in height. The longer the swell period the greater the volume of water pouring over rock and the greater the horizontal velocity or surge. In theory you have more time to make it over the obstruction and will get more push from the wave. A low swell height means that the troughs are correspondingly less deep and it is usually the trough that gets you stuck if your timing is off.

TIMING
As with many things in life, Timing Is Everything!

The key point here is that you are trying to ride the cushion of water created by the wave as it surges over the rock.
Too early and you will be in front of the wave. You risk hitting rock that is not yet covered and worse still you may end up surfing the wave at which point it becomes much more difficult to control your speed and thus your direction.
Too late and the cushion of water will dissipate leaving you sitting high and dry, likely off balance and a sitting duck for the next wave that might engulf you.

Getting the timing right requires observation and often several dummy runs before you go for the full move. The dynamic, inconsistent and often random nature of the ocean is part of its appeal, but it makes timing your move quite challenging. Watch how the wave wraps around the feature. Which direction produces the strongest and more importantly the longest flow, the surge from the incoming wave or the resultant backwash? If you can position yourself to utilize the backwash, this is often less energetic, more prolonged and thus safer than the incoming surge. The retreating wave can transform a rock face into a cascade of white and you can shoot the waterfall just like you would on a river.

Getting your timing right is all about practice so choose a feature that has minimal consequences to get your timing down. I have students paddle around a rock adjacent to a soft sand beach and within the break zone. It is a great feature to practice on as the consequences if you get it wrong are that you end up high and dry on the beach which produces much hilarity within the group.

SKILLS
An effective forward stroke is the pre-requisite to many sea kayaking skills. And so it is within rock gardens, when the need to accelerate quickly is the key to nailing the trickier moves. You may know when you want to go, but if you can't get the boat to move with you quickly enough, you will miss your opportunity, or worse be too late and run the risk of running out of water.

Since the water will likely be receding on the 'downstream' side of the rock feature you are likely to be dropping bow first into aerated water which will offer little in the way of support so be ready for a solid brace. Remember to protect the shoulders by keeping the elbows in on the high brace!

If the drop on the other side is a big one, or if you are going to be punching through an oncoming wave, remember to spear the water with your paddle. Avoid having the paddle shaft across your body as you run the risk of snapping your paddle across your torso (or worse still your face!)

If you should get stuck on the rock resist the temptation to use your hands to push yourself off the rock. Wet skin on barnacles or mussel shells results in cut hands. You need to decide. quickly if you should remain in your boat (almost always my preferred option) or try to bail out

before the next wave arrives. If you decide to bail, make sure you exit the boat on the ocean side and then get the hell out of there and let your buddy recover your boat.

SUMMARY
The pour-over can be mastered by most intermediate paddlers and if you are sensible and don't try to go too big too soon, you can enjoy this fun move without harming your boat or your body. The key is to choose your features wisely and paddle with folk you trust to get you out of trouble if things go wrong. Consider attending a rock garden safety and rescue class before getting too heavily involved in that scene, and always, ALWAYS wear a helmet and consider wearing gloves and elbow pads.

TEACHING STRATEGIES

So how do you teach rock gardening safely?

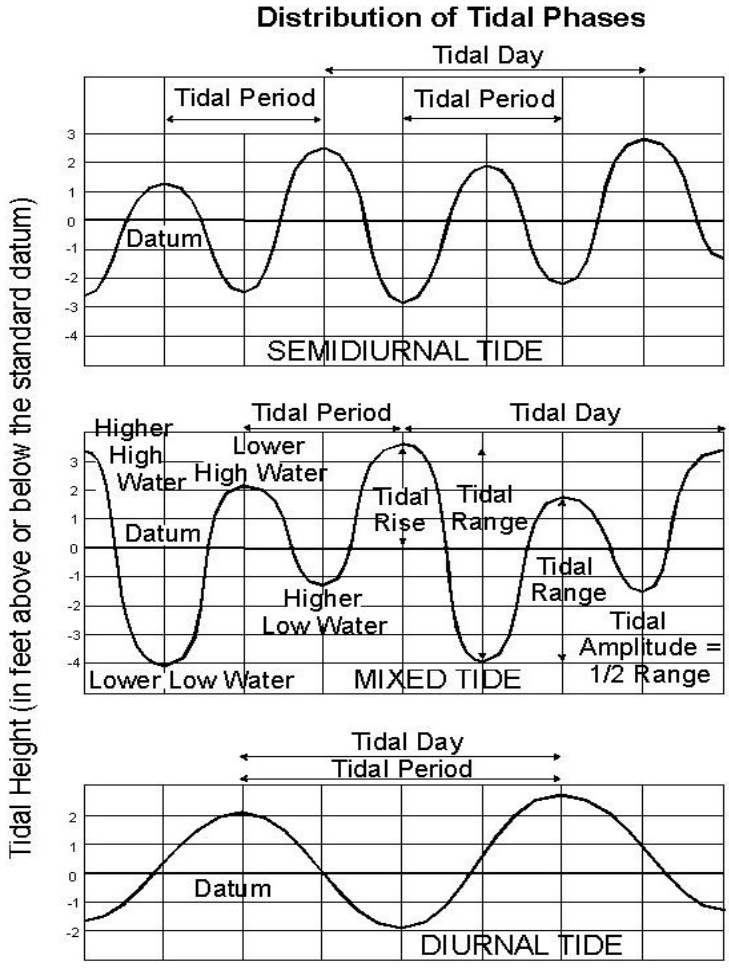
- It is perfectly acceptable to be upfront and realistic about the potential for injury.
- It is simply not possible to guarantee that a participant will not injure themselves during a rock garden class.
- Be honest about it and allow participants to make an informed decision whether to participate.
- Give participants the knowledge and understanding so that they can make their own, personal assessment of risk.
- Ensure they are appropriately dressed and equipped.
- Build an appropriate progression into the structure of the class.
- Everything must be 'Challenge by Choice'.
- Have the group well-versed in rescue techniques and encourage self and peer rescue but be prepared to take-over control of the rescue if necessary.
- Practice your own rescue skills so that they are fast and effective when they need to be.
- Venue selection is critical.
- Remember that fear is a barrier to learning and that baby steps and repetition will likely achieve better results than over-exposing students to dynamic features.
- Ego can manifest itself in rock garden paddling more so than in other environments.
- Make sure that you set a good example. Only run features that allow you to demonstrate safe, effective and efficient technique and save the riskier moves to your personal paddling time.

5.4 Teaching in Current

Much like the other environments we teach in, teaching in current requires knowledge and understanding of the environment, such that we can not only recognize learning opportunities and hazards as they exist, but also be able to predict what is likely to occur.

Most coastal kayak instructors will be teaching in salt water, but we must recognize that there are a significant number of instructors who teach in the Great Lakes region of the USA and Canada where the current they will be working in is fresh water, river current. The principles are largely the same and this manual will focus on salt water and the lateral movement of a body of water caused by a change in tide level.

TIDES & CURRENT



To understand current, you need to understand tides.

Tides are another kind of wave motion in the ocean. Tides are a change in the ocean water level, typically reaching a high and low level twice a day usually occurring about 5 hours & 50 minutes apart.

The term for the change from low to high tide is called the "flood tide". The change from high tide to low tide is called the "ebb tide".

Tides result from the pull of gravity; on the earth alone, between the earth and moon and between the earth and the sun.

The gravitational pull of the sun on the earth is about 178 times stronger than the gravitational pull on the earth from the moon.

However, because of the proximity of the moon, when compared to the sun, the tidal pull by the moon is over twice that of the sun.

The result of this tidal pull is a bulge in the ocean water almost in line with the position of the moon; one bulge toward the moon and one on the opposite side of the earth, away from the moon. When we observe the tides what we are seeing is the result of the earth rotating under this bulge.

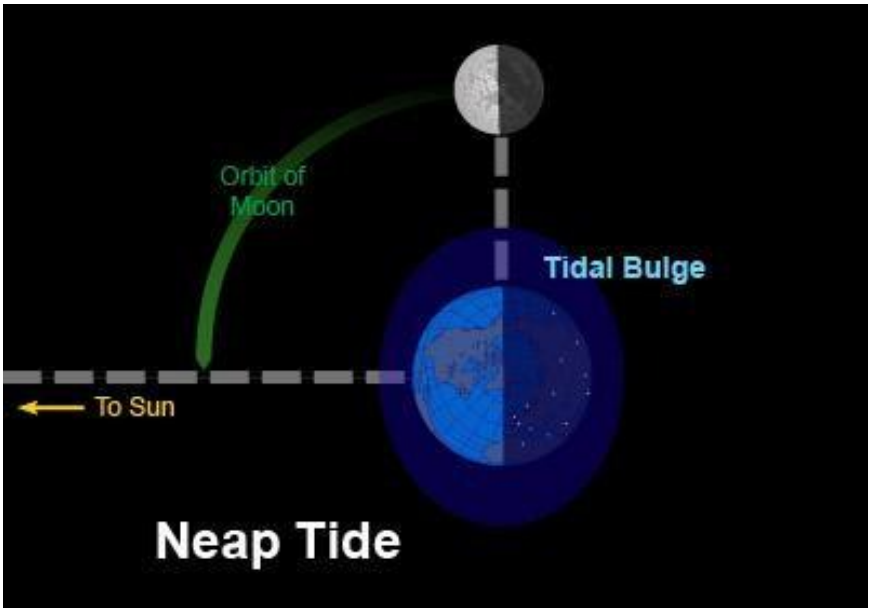
This change in the water level with the daily tides from location to location results from many factors. The oceans and shorelines have complex shapes and the depth, and configuration, of the sea floor varies considerably. Thus, some locations only experience one high and low tide each day, called a diurnal tide. Other locations experience two high and low tides daily, called a semi-diurnal tide. Still, other sites have mixed tides, where the difference in successive highwater and low-water marks differ appreciably.

Another factor in the variation of tides is based on the orbit of the moon around the earth and the earth around the sun. Both orbits are not circles but ellipses. The distance between the earth and moon can vary by up to 13,000 miles (31,000 km). Since the tidal force increases with decreasing distance then tides will be higher than normal when the moon is at its closest point (called perigee) to the earth, approximately every 28 days.

Likewise, the earth's elliptical orbit also causes variations in the sun's pull on the tides as we move from the closest point to the farthest point (called apogee) over the course of a year. And just to complicate things even more, the moon's orbit is inclined 5° to the earth's rotation, so the north/south orientations of the bulge also varies between the northern and southern hemisphere over this same 28-day orbital period.

As the moon completes one orbit around the earth (about every 28 days), there are two times in each orbit when the earth, moon and sun are in line with each other and two times when the earth, moon and sun are at right angles. When all three are inline (around full and new moons), the combined effect of the moon's and sun's pull on the earth's water is at its greatest

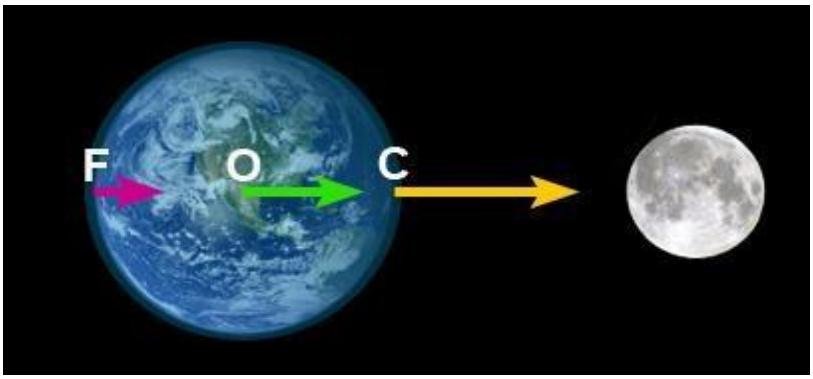
resulting in the greatest ranges between high and low tide. This called a "spring" tide (from the water springing or rising).



Seven days after either full or new moon, the earth, moon and sun are at right angles to each other. Now the pull of the moon and the pull of the sun partially cancel each other out. The resulting tide, called a "neap" tide, has the smallest range between high and low tide.

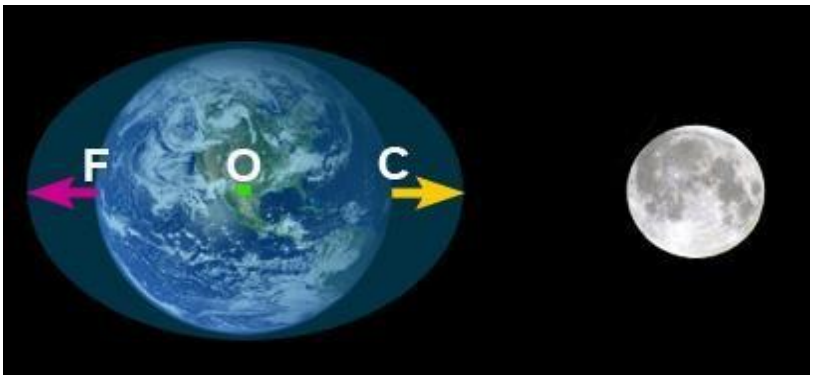
The TWO High Tides

It appears easy to understand why there should be a bulge of water, producing a high tide, on the side of the earth facing of the moon. But why is there a bulge on the opposite side as well? It is obviously not gravity that is doing it but rather, it is the difference in gravitational force across the earth that causes the bulge. This difference in gravitational force comes from the moon's pull at various points on the earth.



Because the pull of gravity becomes stronger as the distance decreases, the moon pulls a little harder at point "C" (closest point to the moon) than it does at point "O" (in the center of the earth), and the pull is weaker still at point "F" (farthest point from the moon). If it were not for the earth's gravity, the planet would be pulled apart (above image).

Yet also because of the earth's gravity which pulls us toward the center of the planet we can, mathematically subtract the moon's pull at the center of the earth from the moon's pull at both point "C" and "F". When this vector-based subtraction occurs, we are left with two smaller forces; one toward the moon and one on the opposite side point away from the moon (image below) producing two bulges.



As the earth makes one rotation in 24 hours, we pass under these areas where the tidal force pulls water away from the earth's surface and experience high tides. Also, since the difference in gravitation force is constant across the earth, the bulge on both sides of the earth is essentially the same. Which explains why consecutive high tides are nearly the same height each time regardless whether the moon is overhead or on the opposite side of the earth.

The rise and fall of the tide approximates a sinusoidal curve, i.e. it starts out slow then increases the fastest at about half tide then slows down to a very slow finish.

THE RULE OF TWELFTHS

The “Rule of Twelfths” is handy tool for calculating the approximate amount of rise or fall in tide during each hour of the tidal cycle.

Start by dividing the difference between the low water and high-water height by 12. Let’s make it easy and assume the difference between low water and high-water is 12 ft.

During the Flood, there is 1/12th rise in the first hour; 2/12ths rise in the second hour; 3/12ths rise in the 3rd and 4th hour; then back down to 2 /12ths in the 5th hour and 1/12th in the 6th hour. The same occurs in reverse during the Ebb.

The TOTAL is what is found at the END of that hour:

FLOOD TIDE

During:	Fraction:	Rise:	TOTAL:
1st hour	1/12th	1ft	1ft
2nd hour	2/12th	2ft	3ft
3rd hour	3/12th	3ft	6ft
4th hour	3/12th	3ft	9ft
5th hour	2/12th	2ft	11ft
6th hour	1/12th	1ft	12ft

EBB TIDE

During:	Fraction:	Fall:	TOTAL:
1st hour	1/12th	1ft	11ft
2nd hour	2/12th	2ft	9ft
3rd hour	3/12th	3ft	6ft
4th hour	3/12th	3ft	3ft
5th hour	2/12th	2ft	1ft
6th hour	1/12th	1ft	0ft

The rule of twelfths works well enough for anyone used to working with feet, fathoms, etc.

For anyone more at home working in decimal the **Rule of Tenths** might be easier to use.

Instead of using twelfths, use percentages:

10% for the 1st hour of range
15% for the 2nd hour of range
25% for the 3rd hour of range
25% for the 4th hour of range
15% for the 5th hour of range
10% for the 6th hour of range

Before any mathematician point out that 10% isn't the same as a 12th it should be reiterated that the rule of twelfths and the rule of tenths should only be used to give an estimate.

TIDAL CURRENT

Ocean paddlers plan their route, campsites and crossings depending upon the current. But instead of trying to understand how current works in words, go check out a river. In tight sections the water speeds up, when it hits an obstacle it goes around it and creates an eddy behind, when it opens into an area such as a pond it slows down or stops.

In many areas, you can purchase not only a tide table, but a current chart as well. These are helpful in pointing out the "eddies" and "ponds" when you can't visually spot these features due to the sheer scale of it all.

It's also handy for paddlers to know when *slack* tide occurs and for how long it will last. Slack tide is the time when the tidal bulge is at its peak or trough, when the current is not moving, between an ebb and flood.

To figure out how much time you have in a slack period, **divide 60 (minutes) by the scheduled max current speed for your area.** It's not that the current is not moving at all, but that it isn't moving much in relation to *max* ebb or flood.

In max ebb or flood, the water is moving in or out of a channel, bay, etc. at its greatest rate of volume (and therefore speed). This is when *tide races, whirlpools, standing waves*, etc. are at the greatest intensity. This can be either fun or suicide depending on where you are paddling. These events can be amplified even more if there is a *conflicting wind.* (opposite direction to current) By the way, we call a wind moving south a "north" wind, and a current moving south a south or "southerly" current.

INTERPRETING TIDAL CURRENT PREDICTIONS

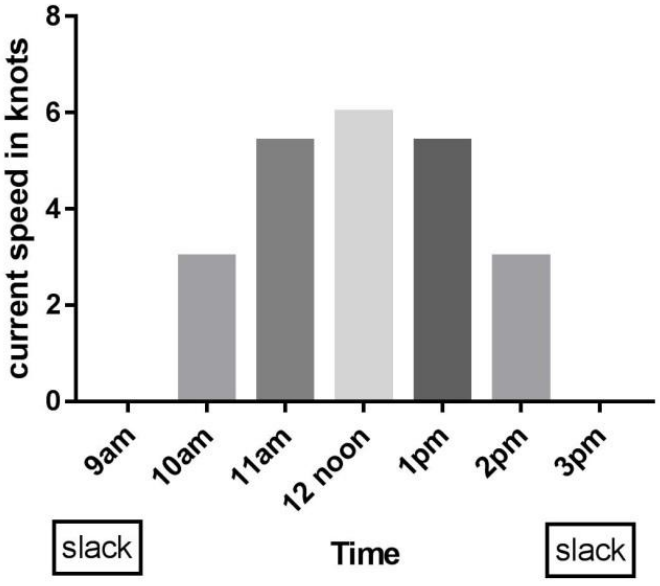
Jennifer Yearley, ACA L5 AOWCK Instructor, BC Advanced Sea Kayak Leader

Ocean tides result from the gravitational pull of the moon and sun on the earth. The vertical rising and falling of the water which we observe along our coasts and in our harbors is associated with a horizontal movement of water flowing in, as the tide goes from low to high, or flowing out, as the tide goes from high to low. In the case of the water flowing in, this movement is known as a flood current. In the case of flowing out, the movement is known as an ebb current. Along the coast of California, we have roughly 2 full tide cycles per day. So twice each day, the water flows in on a flood current to raise the water level from low to high, and the water flows out on an ebb current to decrease the water level from high to low. Tidal currents can be very strong. Maximum current speeds at the entry into San Francisco Bay can reach 6 knots or more, which is roughly twice the speed an average kayaker can paddle. In some unusual locations, such as Skookumchuck Narrows in British Columbia, maximum tidal currents can exceed 16 knots!

Current predictions are specific for particular locations, known as Current Stations, and current speeds and timing at one location, such as at the Golden Gate, can be very different from other locations which may be close by, such as the entry to Richardson Bay. Knowing the exact location for which your prediction has been given is important! Information provided in a current prediction is usually limited, and will typically include times and speeds of maximum flood and ebb, and times of slack water ("slack"), when there is no current moving in or out. In our region, current gradually builds from slack over the course of approximately 3 hours to reach its maximum rate, then decreases over about another 3 hours back to slack, as in the example forecast below.

Forecast:
9am – slack before ebb
12pm - max ebb, 6kts
3pm – slack before flood

One rule of thumb to use in estimating current speeds in between "slack" and "max" for either flood or ebb, is the 50-90 Rule. Using this principle and the assumption that the time from slack to slack is 6 hours, the current speed will increase to 50% of maximum by the end of the first hour post slack, will increase to 90% of maximum by the end of the second hour post slack, and will reach 100% at the time of predicted max current. Likewise, the current will decrease to 90% of max in the first hour after maximum is reached, will decrease to 50% of max in the second hour after maximum is reached, and will drop to nothing by the end of the third hour, at which time we are back to slack. An example of this would be the following. Using the 50-90 rule and this forecast, the current speed would be 0kts at 9am, 3kts at 10am (50% of max), 5.4kts at 11 am (90% of max), 6kts at noon, 5.4kts at 1pm, 3kts at 2pm, and 0kts at 3pm.



Having this information at our disposal, what can we do with it? Here are some examples:

1) You are launching from within San Francisco Bay in the morning and paddling out the Gate, knowing that you will be making use of a good strong ebb current to help you on your way. You know that on your way back, you will need to round Lime Point to get back to your launch site. What is the earliest you could anticipate being able to make it back around the Point? On a day like this, the 50-90 rule indicates that, for most paddlers, it will be necessary to wait till almost 3pm before this is going to be feasible. On a day with a 3kt maximum in contrast, 2pm would probably be just fine to round the point (1.5kt predicted current speed), while 1pm would still be quite challenging, with current speed predicted to be around 2.7kts – very hard to make headway against!

2) You are interested in going to play at Yellow Bluff. The tide race at Yellow Bluff forms during strong ebbs and, in general, the water becomes more dynamic as the current speeds up. In this instance, it is very useful to know that current speed in the two hours on either side of max ebb are only very slightly slower than current speed at max itself, so that 2-3 hour window is going to provide the best playtime!

3) Current speeds will also significantly affect your speed of travel in journeys where you are trying to determine how long it will take you to cover particular distances in trip planning. A 2kt current in your direction of travel will result in your traveling at 5kts if you are a 3kt paddler! However, a 2kt current against your direction of travel will slow you to the snail's pace of 1kt, such that it would take you a full hour to cover just 1 nautical mile. Ouch!

While the 50-90 rule is a rough guide rather than a precision predictor of current speed, it can provide important fundamental orientation. Research your currents in advance and you will be able to prepare and plan for the best trips and playtime!

TEACHING STRATEGIES

Teaching in current requires careful venue selection, a thorough risk assessment and planning to mitigate risk and maximize learning.

The goal of the class and the objectives of your students combined with the current predictions, weather forecast, and local knowledge will determine when you should be there. The beauty of working with the tidal predictions is that barring abnormal amounts of fresh water run-off, extreme high or low barometric pressure, the tide can be relied upon to perform as expected!

Working alone can be challenging since separating from the group is always a concern should a capsize result in a swim. Having a co-instructor, assistant or safety boater as a 'catcher' positioned downstream can enhance safety and allow you to focus on the group.

If you are working on your own, determine what the course of action should be for the group should it be necessary for you to be involved in a rescue. Do they remain in the eddy or follow you as you effect the rescue? Much will depend on the speed of the current, the size of the eddy you are working from, what hazards lay downstream and the ability of the group. A communication protocol using a combination of paddle signals, whistle blast or marine VHF radio will help avoid confusion and unplanned separation.

The risk presented by any fixed object in the area you are operating in cannot be overstated, especially if there is the potential for a swimmer to be swept underneath, such as tree limbs, floating docks, boats or barges and large navigational buoys. Very little current is needed to pin a kayak to a hazard and extrication of the paddler may prove extremely challenging and hazardous to those involved.

CROSSING EDDYLINES

A fundamental skill for paddling in current is how to cross an eddyline. An eddyline is the seam between the main current and an eddy, or where two currents meet. The eddyline may be well defined close to the obstruction that created the eddy. Further downstream the eddyline will likely be more of a zone, where mixing occurs over a wide area and whirlpools form.

A eddylines in fast moving current can also be described as 'eddy fence', particularly if there is a significant change in elevation. It may require considerable speed to punch through the 'fence'. The mnemonic "P.A.V.E.S." can be used to teach students how to cross an eddyline.

P – Position
A – Angle
V – Vision
E – Edge
S – Speed

POSITION

It is typically easier to cross the eddyline where it is most defined at the top of the eddy, close to the obstruction.

ANGLE

The angle that you use to cross the eddyline depends on where you want to go but will always be less than 90 degrees. If you wish to make an attainment (move upstream, past the obstruction), you may want very little angle. If you want to go across the current (ferry glide), your angle will depend on the speed of the current – the faster the current the shallower the angle. If you want to break into the current and go downstream (break in) you will want more angle (~60 degrees). If you have too much angle, your bow may get swept downstream before the length of your kayak has crossed the eddyline. This may result in you getting stuck in the

'eddy fence'. If you want to deliberately spin on the eddyline you may want more angle (~90 degrees).

VISION
As with the rest of our paddling skills, we look where we want to go. Turning our head and torso in the intended direction of travel will help bring the boat around too.

EDGE
We want to avoid the current piling onto the deck of our kayak and causing us to capsize so we edge the boat downstream, encouraging the water to go under the hull of our kayak as we cross the eddyline. The amount of edge we will need depends on the design of the kayak, the speed of the current and our angle to the current. The faster the current, the more edge we will need to avoid a capsize.

SPEED
The speed we need to cross the eddyline depends on where we want to go and the speed of the current. We need to ensure that we get the entire length of our kayak through the 'eddy fence'. Insufficient speed (or too much angle) and the bow of the kayak will get swept immediately downstream and we may find ourselves stuck in the 'eddy fence'.

TIDE RACES & OVER-FALLS - DEFINITIONS

A tidal race or tidal rapid is a natural occurrence whereby a fast-moving tide passes through or around a constriction, resulting in the formation of standing waves, eddies and whirlpools.

An over-fall is a turbulent stretch of open water caused by the wind blowing against a current, by a strong current or tide over an underwater ridge, or by a meeting of currents. An over-fall may be found downstream of a tide race. They are characterized by breaking waves, boils, ill-defined whirlpools and swirling current.

Teaching Progression

A maximum current of 3kts is sufficient for novices. Wind against current will increase the potential for surf-able waves.

1. **Break-ins/Break-outs** – aim to progressively tighten the circle. Practice stacking into the eddy to avoid collisions. The first person into the eddy enters as high as possible, and subsequent paddlers stack below them.

   TEACHING TIP: Have students experiment with making their last stroke on the upstream and downstream side, as they cross the eddyline. Making the last stroke on the

downstream side allows you to transition into a low brace turn with inside edge for a stable controlled break-in/break-out.

2. **Attainments** – best done before the current gets too strong! Challenge them to be as efficient as possible, and minimize the number of strokes used to make the attainment.

   TEACHING TIP: For those that find the attainment easy, have them paddle on just one side, or even harder - one side without taking the paddle out of the water.

3. **Ferry Glides** – position yourself in the current to act as a buoy using ranges to hold position. Have students ferry across to you, give you a paddle 'high-five' and return to the eddy. Challenge them to use ranges in-front or behind them to draw a straight line across the sea bed to your position. In faster current where a straight line ferry is too challenging, introduce the concept of 'putting money in the bank' or 'get high, stay high'.

   TEACHING TIP: For those that find the attainment easy, have them do the ferry glide in reverse (paddling backwards).

4. **Surfing** – if conditions are favorable and surf-able waves are present, encourage playtime. This is when capsizes are most likely. Have students observe the different types of waves present in a tide race. These may be standing waves, wind driven waves, boat wakes and swell. To achieve the best surf rides it is often best to work your way up through the tide race.

5. **Spins** – an excellent way to teach water reading and edge control is to have students deliberately spin their kayaks on the eddyline, using the force of the opposing currents rather than paddle strokes. By keeping the body over the eddyline and just poking the bow or stern of the kayak into the current, a graceful dance down the eddyline can be achieved. In faster current, capsizes are likely!

6. **Rescues** – rescue strategies in current differ from those in other environments. Have students practice rolls, self and assisted rescues in the current. It is a great way to identify the go-to self-rescue in authentic conditions.

6. Navigation

Teaching kayak navigation can be one of the most challenging aspects on being a Coastal Kayak Instructor. You need to first understand a potentially complex subject and then be able to break it down into bite-size chunks for your students. Most reference literature on the subject goes into considerable, arguably too much depth and it is easy to become bogged down. Instead of sharing what you know, ask yourself, what do your students NEED to know?

The first thing to recognize is that, no matter how accurate your calculations are, you are paddling a craft that is almost impossible to paddle in a perfectly straight line. Therefore, error of +/- 5 degrees is inevitable. Building that into your rationale early on and always erring on the side of caution, will allow you to gloss over the minutiae and come up with sensible, practical solutions that will be easier for you to explain to your students and for your students to understand.

But terminology is important and there is a whole language associated with navigation that you need to know (See Coastal Kayak – Glossary of Terms)

KAYAK NAVIGATION – What you need to know

Navigation is the art of keeping track of where you are and following the best route to get where you want to go.

There are two main types of navigation on the water:

Piloting:
Navigation using visual landmarks for reference.
The most basic form of piloting is navigation by line of sight without chart or compass; i.e. following a shoreline or paddling to an island which is in sight.
Piloting also can include the use of ranges, compass and chart.

Dead Reckoning:
Navigation using speed, time underway, and a compass course from a known point of departure: necessary when no landmarks are visible (i.e. on long crossings) or when visibility is poor (as in dense fog). Compass and (usually) a chart is necessary.

The most accurate way to navigate is to combine these two methods. For example, a departure time is noted, compass course is paddled at an estimated speed (dead reckoning), and position is checked underway using ranges and visible landmarks (piloting). The best way to avoid getting lost is to keep track of where you are as closely as possible while underway.

Basic Navigation Tools

- Compass
- Chart or map
- Dividers (for measuring distance)
- Parallel rule or protractor (for plotting bearings or course lines)
- Pencil
- Tide and current book
- Watch

Definitions

Range: Alignment of any two stationary objects that will give you a line of position. For example, lining up a closer object (such as a buoy) with a more distant object (such as an island or point of land), defines a line on which you must be positioned. You can hold a course along this line by keeping the two objects aligned while paddling; movement off the line will become apparent when the two objects appear to separate. Ranges can also be used to determine sense of movement or drift. Your movement will be in the direction that more distant objects (background) appear to move relative to closer objects. A range is the simplest and most accurate way to determine a line of position. It is the most important navigational technique for the kayaker**.**

Heading: Direction the boat is pointing.

Course: Direction the boat is moving.

Bearing: Direction to a landmark (usually determined using a compass).

Drift: Direction boat is pushed due to current, wind, or waves (or all three). Drift will cause a deviation between heading and course.

Set Angle: Angle, caused by drift, between heading and course.

Ferry Angle: Angle between heading and course needed to compensate for drift.

Topographic Maps

Topographic maps are used for navigation on or near land. They are useful to kayakers because they show shoreline topography and land features in more detail than most nautical charts. For many areas they come in larger scales than nautical charts and are less expensive.

Topography is shown by contour lines. Contour lines are lines of equal elevation. The difference in elevation between contour lines is the contour interval (listed at the base of the map). With a little practice, peaks, ridges, etc. shown on the map can be identified in the field

and used as landmarks for navigation. Keep in mind that the map view is vertical (looking down on the earths' surface) and the view from the water is horizontal from sea level. Therefore, islands and peaks can be obscured by foreground or background features.

Topographic maps show:

- Scale in statute miles; 1 statute mile = 5280 feet = 0.87 nautical miles.
- Shoreline at mean higher high water (an important distinction form nautical charts which show the shoreline at low tide level).
- Topography of the land using contour lines.
- Land features such as rivers, towns, roads, etc.
- Areas of vegetation (in green).
- Declination (variation between magnetic and true north) at bottom of map.

NAUTICAL CHARTS

Nautical charts are designed for navigation on the water. They show water depth, buoys, lighthouses, and prominent shoreline features which may be useful to navigators. Chart no.1 explains the symbols used on charts. Nautical charts are useful to kayakers because they show aids to navigation (such as buoys) and other marine features not shown on topographic maps. They also have a compass rose which is used for plotting courses.

Nautical charts show:

- Scale in nautical miles; 1 nautical mile = 6080 feet = 1.15 statute miles.
- 1 nautical mile also = 1 minute of latitude (not longitude).
- Shoreline at mean lower low water.
- Water depth in feet or fathoms (1 fathom = 6 ft.); indicated on chart.
- Buoys and other aids to navigation.
- Composition of near shore material (sand, pebbles, mud, etc.).
- Compass rose; outer rose is true north; inner rose is magnetic north, adjusted for magnetic variation.
- Location of reefs, wash rocks, major tide rips, and other potential hazards to navigation.

COMPASS

A compass can be used for steering a course, taking bearings, finding position, identifying landmarks, and checking the effect of wind and current. In short, the compass is used for reading direction. A compass direction is an azimuth, measured in degrees in a clockwise direction from north: north is 000 (or 360) degrees, east is 090, south is 180, and west is 270.

A compass bearing is the direction to a landmark and constitutes a line of position on which you and the landmark must lie. For example, if you take a compass bearing of 070 to a point of land, your position and the point of land lie on a line with an azimuth of 070. From a known position, compass bearings can be used to identify various landmarks (distant coves, beaches, mountain peaks, etc.). Read the compass bearing and plot it on the chart from your known position. Conversely, two or more compass bearings to known landmarks can be used to determine an unknown position. Find the landmarks on the chart, plot bearings (determined with a compass) to these landmarks, and the intersection of bearing lines gives your position. It is rarely practical to plot compass bearings while on the water. Once ashore, however, compass bearings are very useful to check your location.
The easiest type of compass to use on a kayak is a deck-mounted marine compass. With this type of compass, the heading can be read directly from the compass. With a hand-held orienteering compass, it is necessary to adjust the compass dial whenever changing your heading.

To paddle a compass course, point the boat so that the compass reads the appropriate heading. If possible, pick a distant reference mark on the horizon once the boat is on the correct heading. Then check the compass reading occasionally. If the heading has changed, wind or current is pushing you off course and adjustments must be made. Don't slavishly follow a compass heading when it is obviously taking you off the course you want. However, when paddling in dense fog or in the middle of a long crossing, the compass may be your only guide. In this case you need to watch the compass closely and drift won't be noticeable (see compensating for drift, below).

As you paddle, your compass will swing back and forth as much as 10 degrees. Hold your course by keeping the heading you want centered between the swings of the compass. In other words, if your heading is 180, and the compass reading varies by 10 degrees, keep it swinging back and forth from 175 to 185. You will then average 180. This is quite accurate.

A compass points to magnetic north. Unfortunately, magnetic north does not align exactly with true (geographic) north. The difference between magnetic and true north at any given location on the earth's surface is known as magnetic variation (or declination for land navigation). Magnetic variation differs from place to place and is indicated on the map or chart. In the western U.S., magnetic north is east of true north.

In the S.F. Bay Area, magnetic variation is 16 degrees east. This means that when the compass reads 000 magnetic north, it is actually pointing to 016 true north. So, to convert magnetic (any compass bearing) to true, add 16 degrees (note that for simplicity of calculation, 15 degrees is often used rather than 16 degrees). For nautical navigation, this conversion is not made. It is easier to use magnetic north because that is what the compass reads. The inner compass rose on a chart reads magnetic north and can be used to plot compass bearings without any conversion.

If you use the compass rose to plot bearings, you won't have to make any further adjustment.

Topographic maps do not have a compass rose and if compass bearings are plotted using a true north-south line (the usual way), they must be converted to true north. Conversely, azimuths determined from the map must be converted from true north to magnetic north for the compass.

The rule for conversion with east variation (western U.S.) is:

> Converting from magnetic north to true north; **ADD** variation.
>
> Converting from true north to magnetic north; **SUBTRACT** variation.

Remember that the compass always reads magnetic north. So, for example, if your compass reads 030 magnetic (M), to convert to true north (T) for plotting on a topographic map, add the variation (16 degrees in the Bay Area): 030 M + 016 = 046 T. If you measure a course on a topographic map relative to true north at 046 T, to convert this to magnetic north (what the compass will read), subtract 016: 046 T - 016 = 030 M.

Chart Preparation

Plotting courses while underway in a kayak is not practical except in very calm conditions. Courses and other information are best plotted on the chart before departing. Plot course lines to follow the route you intend to paddle. Using a protractor or parallel ruler, determine and label the compass heading for each leg of the course. The compass rose on a chart can be used with a parallel ruler by stepping the ruler over from the course line to the compass rose and reading the azimuth directly. With a topographic map, a protractor can be used to measure the azimuth off a north-south line. In this case the heading will have to be converted from true north to magnetic north. Scale off nautical miles along the course line and mark them. Courses are best plotted between prominent headlands or other obvious landmarks (see figure 1 for an example).

Potential ranges that may be useful can be marked on the chart using solid or dashed lines. Ranges can be used to monitor progress or check position while underway. They can also be used to mark potential hazards such as submerged rocks or reefs.

Information on tides and currents for the day can be marked on a card kept in view in the map case. Currents are important in restricted waterways and estuaries. Tidal height is important near reefs or in areas of extensive mud flats.

Wind and Currents

Remember when planning a trip to account for wind and current direction. Whenever possible plan to paddle with the current and avoid headwinds. Tide and current tables can be used to

predict the times, direction, and strength of currents. When paddling with the current it is best to stay in the deeper part of the channel to take advantage of the fastest water. When paddling against the current stay close to shore (in some cases very close) in shallower water where the current is weaker. Eddies are often present near shore, especially in embayment's and on the down current side of bluffs and points. Eddies move opposite to the main current and are very useful when paddling "upstream."

Knowledge of local weather conditions is necessary to help predict wind direction. In California the prevailing fair-weather winds blow along the coast from the northwest and storms blow from the south. In San Francisco Bay 'sea breezes' can build to 25 knots in the afternoon during spring and summer. These winds blow in through the Golden Gate (westerly, meaning from the west) and follow the axis of the bay; they turn north into the north bay and south into the south bay. In winter and fall winds are fairly calm, except during storms.

Compensating for Drift: Crossing Wind and Currents

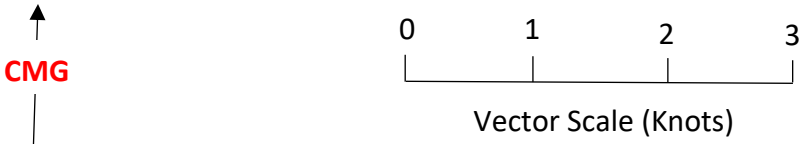
When paddling with wind and current on the beam, the boat will be set in a downwind or down current direction. To compensate for this drift, it is necessary to angle the boat into the wind or current and ferry across to your destination. The best way to determine the correct ferry angle is to use a range to stay on course. Where ranges aren't available (in fog or on a long crossing) the ferry angle must be estimated using current or wind strength and paddling speed. Crossing strong current or wind requires a greater ferry angle and faster paddling speed. Ferry angles for crossing currents can be calculated using a vector solution or formulae or by plotting a course (see following pages).

Note: The more experience you gain paddling on the sea, the less you will have to rely on tools and quantitative methods of navigation. Your ability to read the water and the coastline, judge paddling distance, use ferrying angles, and keep track of where you are going will become largely intuitive. However, there will still be occasions when a chart and compass is indispensable, especially when paddling unfamiliar waters.

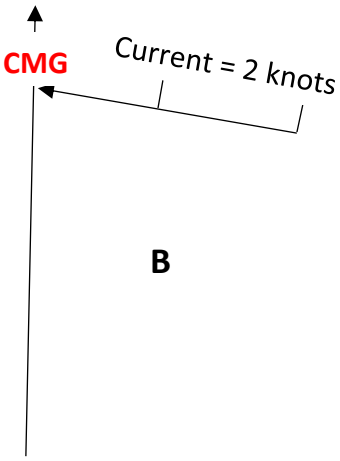
Vector Solution

The following method can be used to determine the ferry angle when paddling across current:

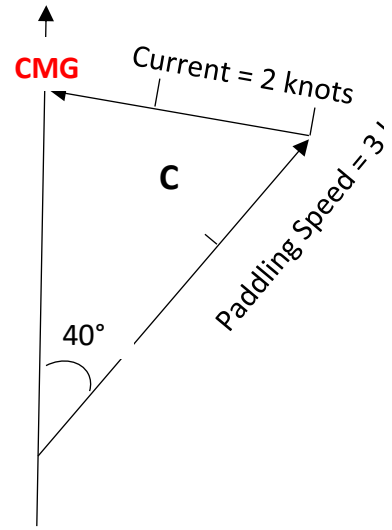
Calculating a Ferry Angle Using a Vector Solution (Good for short crossings of </= 1 Hour)



A. Draw a straight line corresponding to the course you want; Course Made Good (CMG)



B. Draw a current vector showing current direction relative to the course, with the vector arrowhead meeting the course line. Scale the vector to the current speed in knots, using any convenient unit e.g. 1 inch = 1 knot



C. Construct a paddling speed vector by setting dividers to your paddling speed (in knots), using the same units as the current vector. Then place one end of the dividers at the base of the current vector and swing the other end to intersect the course line. Connect these two points, giving you your heading and your ferry angle. If you don't have dividers, a ruler can be used to scale the paddling speed vector.

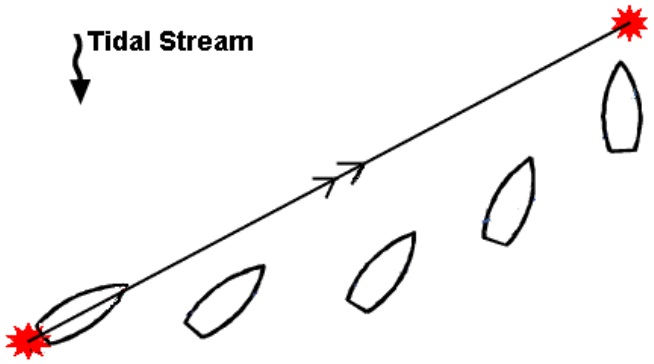
Note: The ferry angle is the angle between the paddling speed vector and the course line. Your heading is the course direction, plus or minus the ferry angle, depending on whether the current is coming from your right or your left.

From: *Sea Kayak Safety & Rescue.* John Lull, 2008. Wilderness Press

Many students find Vector Solutions confusing and will prefer to plot a course to calculate a compass heading.

B. Plotting a Course (Good for crossings > 1 hour)

Before we make a passage across a current we must consider if we need to steer a course to allow for the tide. If there is a tide running across the route and instead of allowing for it, we

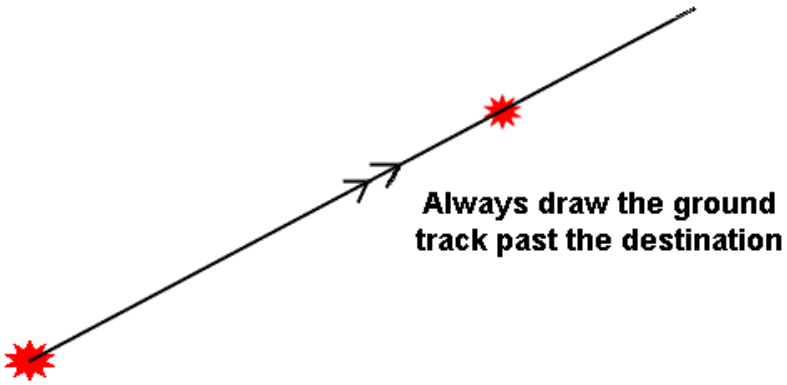


just point the boat to the destination, we will end up paddling in an arc. This will take longer than doing some quick calculations first.

Not only will this approach take longer, but also you may be swept into a dangerous area or in a sailing boat, you may end up paddling directly into the current and unable to make headway.

The first step is to draw in the ground track to the destination.

When you do this, you must draw the line past the point where you intend to stop, even if the line goes over the land! If you do not do this, sometimes you will be unable to complete the diagram correctly.



The next step is to measure the distance from the start to the destination, and by comparing this to the speed you expect to make decide roughly how long the passage will take.

A group of sea kayaker's typical paddling speed is +/- 3 knots. With practice you will learn to guess what the speed of your group is. A surf ski paddler may travel in excess of 5kn.

When we work out the approximate time of passage we are only looking to see if it will be 1 hour or more so that we know how much tidal information to look up.

For example:

- A passage of 3M at 3kn will take about 1 hour.
- A passage of 12M at 3kn will take about 4 hours.
- A passage of 2.5M at 5kn will take half an hour.

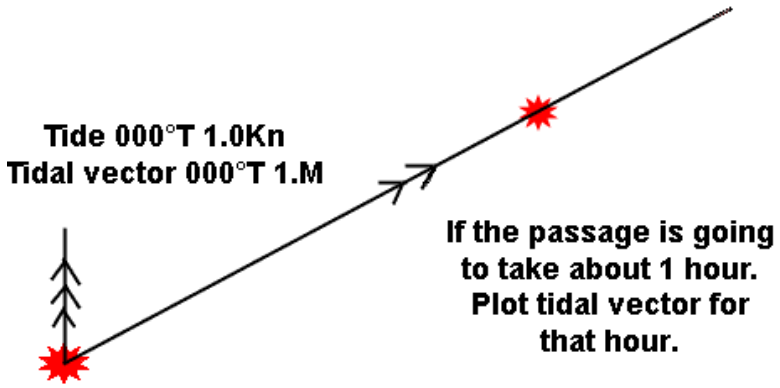
These figures take no account of the tide or wind, so there is no point in trying to be very accurate at this stage.

We need to know the start time of the passage, so if it is going to take about 1 hour, we need to find the tidal stream information for that hour. If we expect it to take two hours, we need to find the tidal stream for those 2 hours.

A passage of 1 hour starting at 1024 will need tidal information for the period from 1024 to 1124.

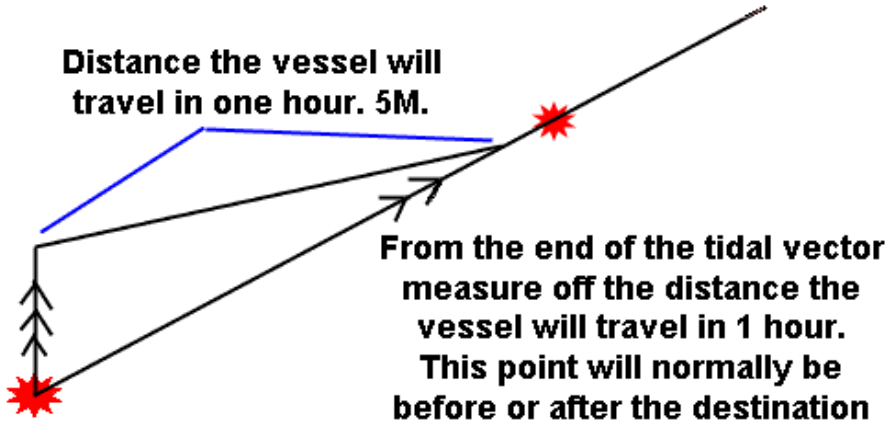
A passage of 3 hours starting at 1345 will need tidal information for the period from 1345 to 1645.

We then need to plot the tidal vector, from our start point!

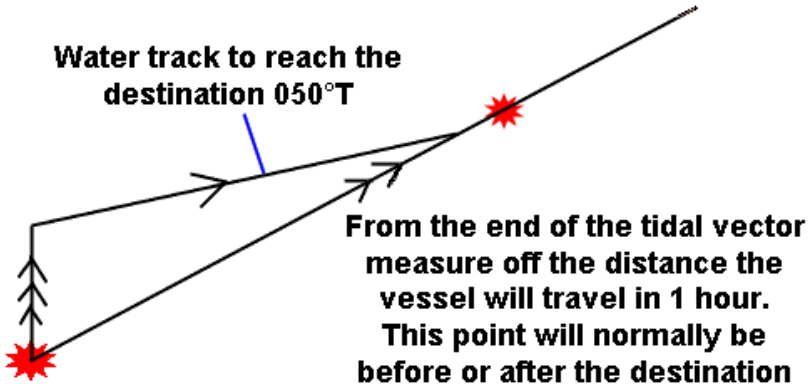


For us to work out the course to steer we must draw a triangle, each side of which represents the same period of time. So, our next step is to measure off the distance we expect to travel

through the water in 1 hour. In this case 5M. This distance is measured from the end of the tidal vector on to the ground track.



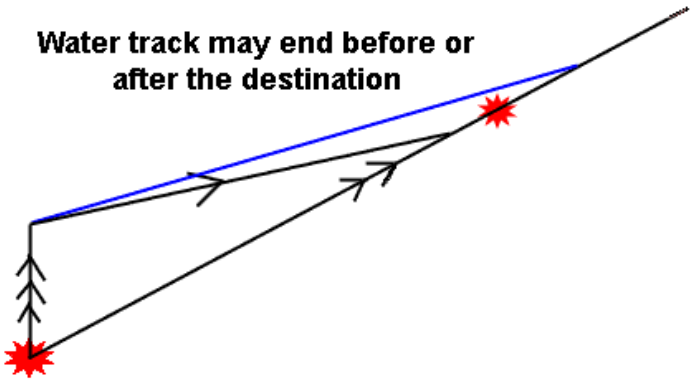
If we then draw this line in, it becomes the water track. It does not matter that the water track has not reached the destination, because you can assume that for a short period, conditions will remain similar, and you can continue on the same course. In practice, you would probably be able to see the destination and could approach it by eye.



The other possibility is that the water track will reach the ground track after the destination. When this happens, it means that the passage will take less than 1 hour, when you arrive at the destination you will stop!

This is the reason that we always draw the ground track past the destination, even if it passes over land. If you have not done this, you will almost certainly plot the water track to the destination.

The water track will very rarely arrive exactly at the destination, if it does when you are doing any navigational training exercises or actual plots you should check your workings carefully as this is unlikely to happen.



The reason it is incorrect is that each side of the triangle must represent the same period of time. If the tidal vector represents the distance the tide will travel in one hour, the water track must also.

Because of this you may have a course to steer which ends up running over the land, provided this is after the point you are aiming for it is not a problem. The course to steer line very rarely ends at the destination, if it does, check through the process again. Make sure you have measured off the distance you expect the boat to travel through the water, from the end of the tide vector!

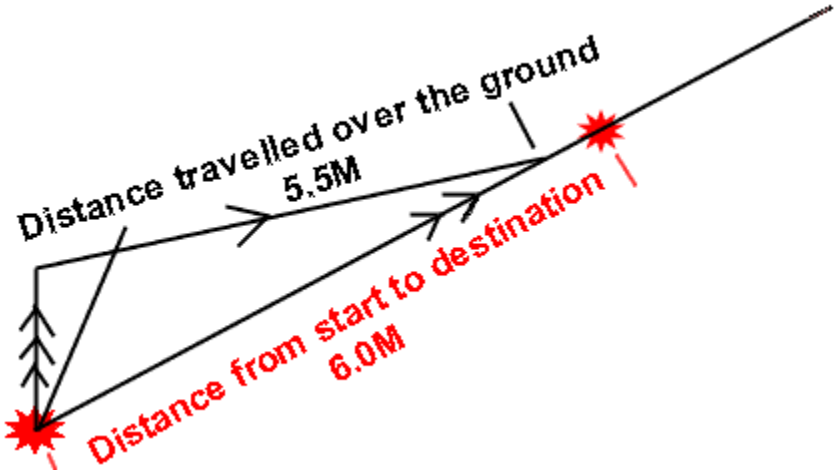
C. Working out the time of passage

The formula for working out how long a passage will take is very simple.

The time = The distance to travel / the speed of the vessel in that direction.

T = D/S

The tricky part is deciding on the vessel's speed. It is not the speed given in the question, that is the speed through the water and takes no account of the tidal effect.



To find the speed over the ground (SOG) we go back to the diagram and measure the distance from the start point to the point where the water track meets the ground track. If this distance is 5.5M and we have constructed the diagram for one hour, the vessels SOG is 5.5Kn.

If the diagram had been based on a half hour passage the SOG would be 11.0Kn because the vessel would cover 5.5M in half an hour.

The calculation is as follows:

T = D/S

T = 6.0M/5.5Kn

T = 1.09 hours

If we multiply this by 60 minutes we have our time of passage in minutes.

T = 1.09 X 60 = 65 minutes.

Passages shorter than 1 hour

When you measure the distance to the destination and compare it to the expected speed of the vessel you may decide that the passage will take much less than one hour. If there is sufficient space on the chart you can still create the diagram for one hour, however it is likely that the diagram may be too large to fit on the chart.

In this case you can use any time period that is suitable. You may choose to draw the diagram for 20 or 30 minutes. The only rule is that each side of the diagram must be for the same period of time.

If the tide is 090°T at 2.0Kn, the tidal vector drawn for half an hour should be 090°T 1.0M, equally if the vessel's speed is 6.0Kn, the water track should be 3.0M long, as this is the distance it will travel in 30 minutes.

Finding the compass course to steer.

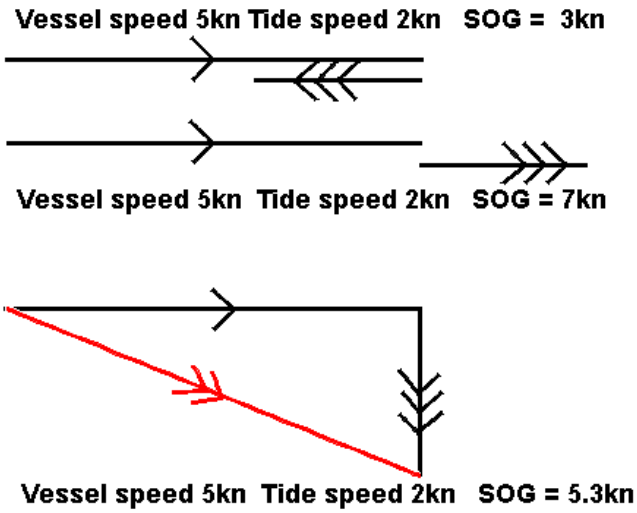
We are ultimately seeking the "Compass course" and MUST take into consideration magnetic deviation. Do all the previous calculations including dealing with leeway if there is any, then apply the deviation as the last step. To convert a True heading to Magnetic we can either use the Compass Rose and a set of parallel rulers or do the calculation. To make this correction in the San Francisco Bay area:

Magnetic Deviation = 15° East – you **subtract** 15° from your True heading to calculate your Compass course: 135° T (-15°) = 120°M

Boat speed over the ground

It is important to realize that the speed through the water will always be different to the speed over the ground if there is a tidal stream.

This is easy to imagine if with the tide or directly against it, but not so simple when travelling at right angles to the current.



In each of the above diagrams, the kayaker travelled 5.0M through the water. In the first, the tide is directly against the kayaker, so the kayaker only covers 3.0M over the ground, in the second example the kayaker would cover 7.0M over the ground. In the third, the kayaker covers 5.3M over the ground-but in a different direction.

The distance travelled over the ground is the distance made good. If it took one hour to make the passage the boat's speed over the ground in the first example would be 3.0kn whilst its water speed was 5.0kn, whilst in the second example the boat's SOG is 7.0kn.

In the last example the kayaker's speed over the ground would be 5.3kn and its *water speed* would still be 5.0kn. The current is helping by increasing the speed over the ground.

The direction the kayak travelled over the ground is the ground track. This is always marked with two arrows and usually given as a true bearing.

Normally you would not draw in the ground track when working up an EP. You have already travelled along it, if there was a hazard you would have already found it!

Always use the tide if possible!

The examples above show why it is vital to paddle with the tide whenever possible. Frequently people think "it's only 2 knots, it won't make much difference". In fact, if you cannot avoid the tide the difference is between 3kn and 7kn, a huge difference in passage time.

In a powered or sailing vessel that can travel at much higher speeds when the sea is flat enough, this is less important. For a kayaker whose speed can be easily matched by the current it is critical.

GO with FLOW!

Reference: http://www.sailtrain.co.uk/index.htm

TEACHING STRATEGIES

- Teach to the environment that your students will be paddling in.
- Use practical methods such as ranges (transits), "get high, stay high", aiming off and handrailing to keep it simple!
- When calculating current speed, round fractions to whole numbers whenever possible.
- Use acetate sheets to overlay on a chart showing step by step how to plot a course.
- In areas of complex currents, do not seek to calculate a vector solution or plot a course. The margin of error is likely too great.
- Have students use both an orienteering compass and a deck compass so that they understand how to read both.

7. Coastal Kayak- Glossary of Terms

ASTRONOMICAL TIDE: The tidal levels and character which would result from gravitational effects, e.g. of the Earth, Sun, and Moon, without any atmospheric influences.

BEAUFORT SCALE: The relationship between sea state and wind speed. The Beaufort Scale can be used to estimate wind speed at SEA, but is valid only for WAVES generated within the local weather system, and assumes that there has been sufficient time for a fully developed SEA to have become established.

CALIFORNIA CURRENT: A deep-ocean boundary current that flows south-southeasterly along the U.S. west coast. The current is shallow, broad and slow moving carrying cold, nutrient poor waters toward the equator.

CHANGE OF TIDE: The change of one TIDE condition (rising or falling) for the other (falling or rising), or of one TIDAL CURRENT direction flow for the other.

CHANNEL: (1) A natural or artificial waterway of perceptible extent which either periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. (2) The part of a body of water deep enough to be used for navigation through an area otherwise too shallow for navigation. (3) The deepest portion of a STREAM, BAY, or STRAIT through which the main volume of CURRENT of water flows. (4) (SMP) An open conduit for water either naturally or artificially created, but does not include artificially created irrigation, return flow or stock watering channels (WAC 173-14-030 (8b)).

CHART DATUM: The plane or level to which SOUNDINGS, tidal levels or WATER DEPTHS are referenced, usually low water datum. See also DATUM PLANE and REFERENCE PLANE.

COASTAL CURRENTS: (1) Those CURRENTS which flow roughly parallel to the SHORE and constitute a relatively uniform drift in the deeper water adjacent to the SURF ZONE. These currents may be TIDAL CURRENTS, transient, wind-driven currents, or currents associated with the distribution of mass in local waters. (2) For navigational purposes, the term is used to designate a current in coastwise shipping lanes where the TIDAL CURRENT is frequently rotary.

CORIOLIS EFFECT: Force due to the Earth's rotation, capable of generating currents. It causes moving bodies to be deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. The "force" is proportional to the speed and latitude of the moving object. It is zero at the equator and maximum at the poles.

COUNTERCURRENT: A secondary current usually setting in a direction opposite to that of a main current.

CROSS SEA: Confused, irregular state of the SEA due to different groups of WAVES from different directions raised by local winds.

CURRENT: (1) The flowing of water, or other liquid or gas. (2) That portion of a STREAM of water which is moving with a velocity much greater than the average or in which the progress of the water is principally concentrated. (3) OCEAN CURRENTS can be classified in a number of different ways. Some important types include the following:

- Periodic - due to the effect of the TIDES; such CURRENTS may be rotating rather than having a simple back and forth motion. The CURRENTS accompanying TIDES are known as TIDAL CURRENTS
- Temporary - due to seasonal winds
- Permanent or ocean - constitute a part of the general ocean circulation. The term DRIFT CURRENT is often applied to a slow broad movement of the oceanic water
- NEARSHORE - caused principally by WAVES breaking along a SHORE.
- Also, COASTAL CURRENTS such as CALIFORNIA and DAVIDSON CURRENTS that run parallel to the COAST.

DAVIDSON CURRENT: Deep-ocean boundary current off the west coast of the U.S. which brings warmer, saltier, low oxygen, high phosphate, equatorial-type water from low to high latitudes.

DIURNAL: Literally of the day, but here meaning having a period or a TIDAL DAY, i.e. about 24.84 hours. See Figure 11.

DIURNAL CURRENT: The type of TIDAL CURRENT having only one flood and one EBB period in the TIDAL DAY. A ROTARY CURRENT is DIURNAL if it changes its direction through all points of the compass once each TIDAL DAY. See Figure 11.

DOUBLE TIDE: A double-headed TIDE; that is, a HIGH WATER consisting of two maxima of nearly the same height separated by a relatively small DEPRESSION, or a LOW WATER consisting of two minima separated by a relatively small ELEVATION.

EBB: Period when TIDE level is falling; often taken to mean the EBB CURRENT which occurs during this period.

EBB CURRENT: The movement of a TIDAL CURRENT away from SHORE or down a tidal stream. In the SEMIDIURNAL type of reversing current, the terms greater ebb and lesser ebb are applied respectively to the EBB CURRENTS of greater and lesser velocity of each day. The terms of maximum ebb and minimum ebb are applied to the maximum and minimum velocities of a continuously running EBB CURRENT, the velocity alternately increasing and decreasing without coming to a slack or reversing. The expression maximum ebb is also applicable to any EBB CURRENT at the time of greatest velocity.

FETCH: The length of unobstructed OPEN SEA surface across which the wind can generate WAVES (GENERATING AREA).

FLOOD CURRENT: The movement of a TIDAL CURRENT toward the SHORE or up a tidal STREAM. In the SEMIDIURNAL type of reversing current, the terms greater flood and lesser flood are applied respectively to the flood currents of greater and lesser velocity each day. The terms maximum flood and minimum flood are applied to the maximum and minimum velocities of a flood current the velocity of which alternately increases and decreases without coming to slack or reversing. The expression maximum flood is also applicable to any flood current at the time of greatest velocity.

FLOOD TIDE: A nontechnical term used for rising TIDE or FLOOD CURRENT. In technical language flood refers to current. The portion of the tidal cycle between LOW WATER and the following HIGH WATER.

GALE: A wind between a strong breeze and a storm. A continuous wind blowing in degrees of moderate, fresh, strong, or whole gale and varying in velocity from 28 to 30 NAUTICAL MILES per hour.

GROUND SWELL: (1) Long high SWELL in DEEP WATER. (2) Also, this SWELL as if rises to prominent height in SHOAL water.

HIGHER LOW WATER (HLW): The higher of the two low waters of any TIDAL DAY. See Figure 11.

HIGH SEAS: This term, in municipal and international law, denotes all that continuous body of salt water in the world that is navigable in its character and that lies outside territorial waters and maritime belts of the various countries, also called OPEN SEA.

HIGH WATER (HW): Maximum height reached by a rising TIDE. The height may be solely due to the periodic tidal forces or it may have superimposed upon it the effects of prevailing meteorological conditions. Nontechnically, also called the high tide.

HURRICANE: A cyclonic storm, usually of tropic origin, covering an extensive area, and containing winds more than 75 miles per hour.

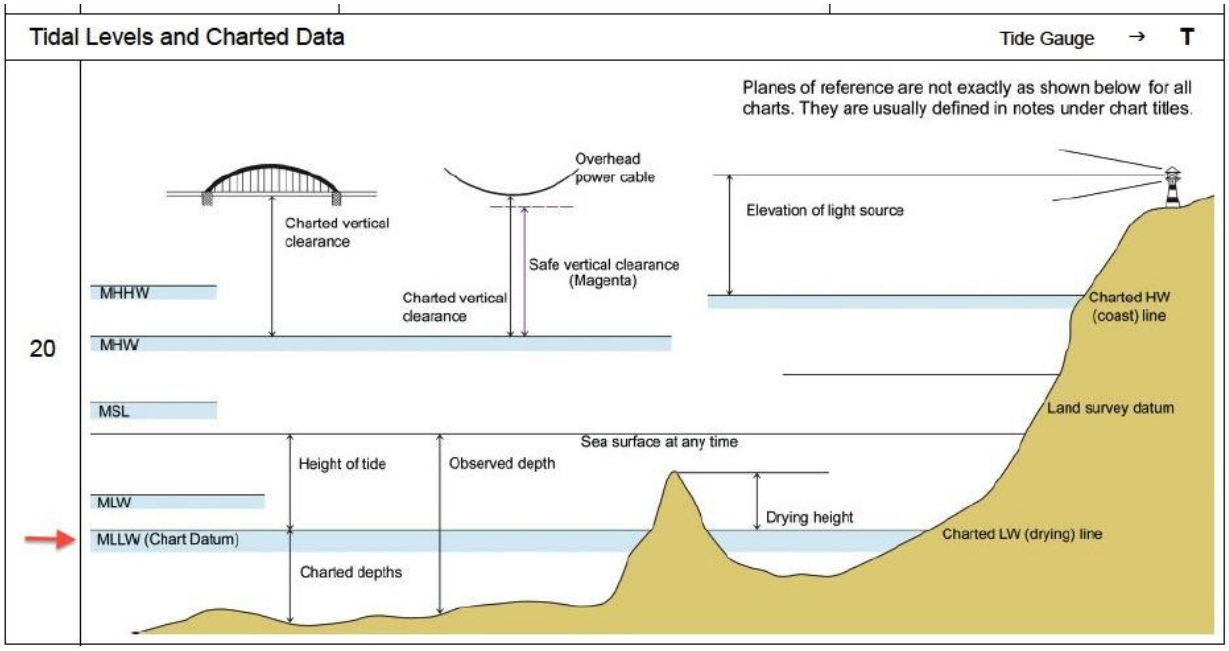
INTERTIDAL: The zone between the HIGH and LOW WATER marks.

KING TIDE: is a popular term used to refer to an especially high tide. ‘King tide’ is not a scientific term, nor is it used in a scientific context. The king tides occur when the earth, moon and sun are aligned at perigee and perihelion, resulting in the largest tidal range seen over the course of a year. Alignments that are ‘near enough’ occur during approximately three months each winter and again for three months in the summer. During these months, the high tides are

higher than the average highest tides for three or four days. The predicted heights of a king tide can be further augmented by local weather patterns and ocean conditions. Winter king tides may be amplified by winter weather making these events more dramatic. In the northern hemisphere, the term king tide is used to describe each of these winter high tide events.

KNOT: The unit of speed used in navigation. It is equal to one NAUTICAL MILE(6076.115 feet or 1852 meters) per hour.

LOWER LOW WATER (LLW): The lower of the two low waters of any TIDAL DAY. The single LOW WATER occurring daily during periods when the TIDE is DIURNAL is considered to be LLW.



LOWER LOW WATER DATUM: An approximation to the plane of MEAN LOWER LOW WATER that has been adopted as a standard REFERENCE PLANE for a limited area and is retained for an indefinite period regardless of the fact that it may differ slightly from a better determination of MEAN LOWER LOW WATER from a subsequent series of observations.

LOW TIDE: See LOW WATER

LOW TIDE TERRACE: A flat zone of the BEACH near the LOW WATER level.

LOW WATER (LW): The minimum height reached by each falling TIDE. Nontechnically, also called LOW TIDE.

LUNAR DAY: The time of rotation of the Earth with respect to the moon, or the interval between two successive upper transits of the moon over the meridian of a place. The mean lunar day is approximately 24.84 solar hours in length, or 1.035 times as great as the mean solar day. Also called TIDAL DAY.

LUNAR TIDE: The portion of the TIDE that can be attributed directly to attraction to the Moon.

MEAN HIGHER HIGH WATER (MHHW): The arithmetic average of the elevations of the HIGHER HIGH WATERS of a MIXED TIDE over a specific 19-year period. For shorter periods of observation, corrections are applied to eliminate known variations and reduce the result to the equivalent of a mean 19-year interval.

MEAN HIGH WATER (MHW): The average ELEVATION of all high waters recorded at a particular point or station over a considerable period of time, usually 19 years. For shorter periods of observation, corrections are applied to eliminate known variations and reduce the result to the equivalent of a mean 19-year value. All HIGH WATER heights are included in the average where the type of TIDE is either SEMIDIURNAL or MIXED. Only the HIGHER HIGH WATER heights are included in the average where the type of TIDE is DIURNAL. So determined, mean high water in the latter case is the same as MEAN HIGHER HIGH WATER.

MEAN HIGH WATER SPRINGS (MHWS): The average height of the HIGH WATER occurring at the time of SPRING TIDES.

MEAN LOWER LOW WATER (MLLW): The average height of the lower low waters over a 19-year period. For shorter periods of observation, corrections are applied to eliminate known variations and reduce the result to the equivalent of a mean 19-year value.

MEAN LOW WATER (MLW): The average height of the low waters over a 19-year period. For shorter periods of observation, corrections are applied to eliminate known variations and reduce the result to the equivalent of a mean 19-year value.

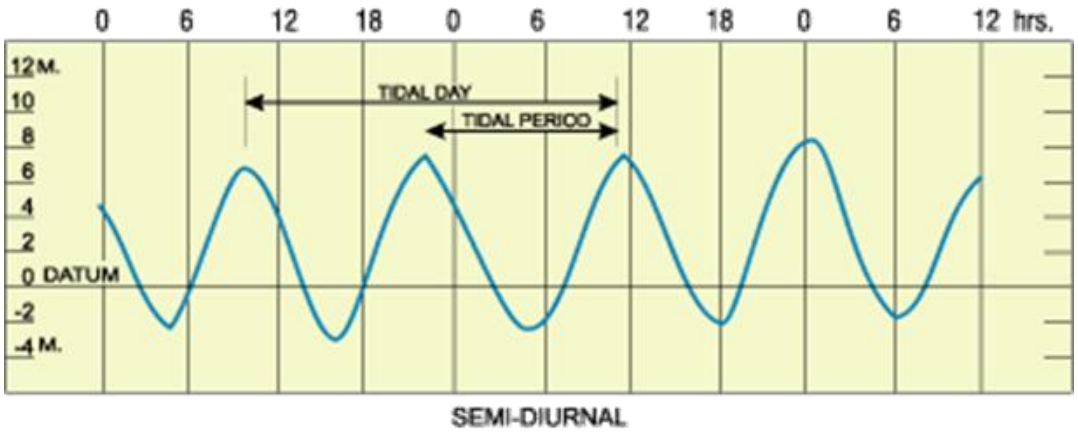
MEAN LOW WATER SPRINGS (MLWS): The average height of the low waters occurring at the time of the SPRING TIDES.

MEAN RANGE OF TIDE: The difference in height between MEAN HIGH WATER and MEAN LOW WATER.

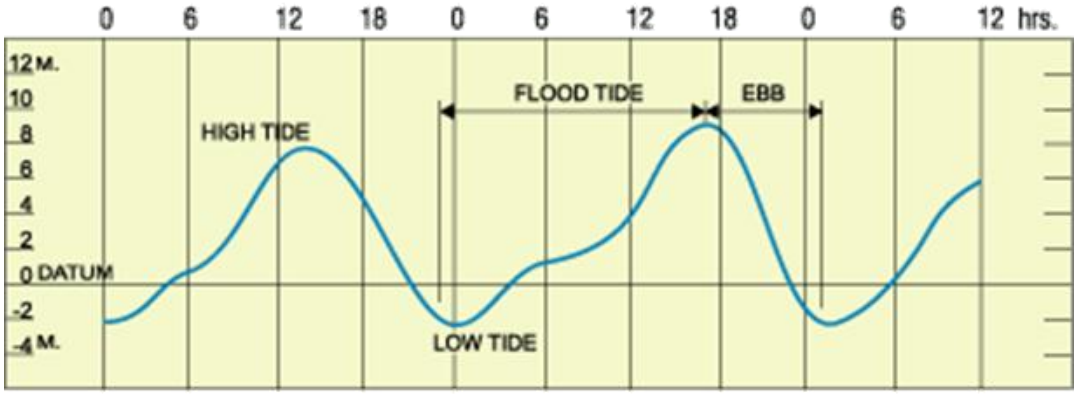
MEAN WAVE PERIOD: The mean of all individual WAVES in an observation interval of approximately half an hour.

MIXED TIDE: Type of TIDE which the presence of a diurnal wave is conspicuous by a large inequality in either the high or LOW WATER heights with two high waters and two low waters

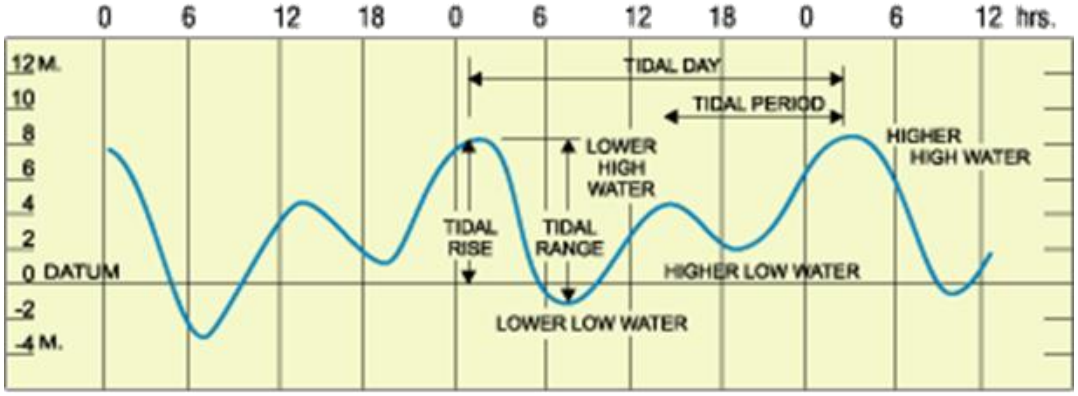
usually occurring each TIDAL DAY. In strictness, all TIDES are mixed, but the name is usually applied without definite limits to the TIDE intermediate to those predominantly SEMIDIURNAL and those predominantly DIURNAL.



SEMI-DIURNAL



DIURNAL



MIXED

NATIONAL TIDAL DATUM EPOCH (NTDE): A period of 19 years adopted by the National Ocean Service as the period over which observations of TIDES are to be taken and reduced to average values for TIDAL DATUMS.

NAUTICAL MILE: Also, known as geographical mile, its length is 1852 meters (6076.115 feet), approximately 1.15 times as long as the statute mile of 5280 feet.

NEAP HIGH WATER: See NEAP TIDE.

NEAP LOW WATER: See NEAP TIDE.

NEAP RANGE: See NEAP TIDE.

NEAP TIDAL CURRENT: TIDAL CURRENT of decreased velocity occurring semimonthly as the result of the moon being in quadrature.

NEAP TIDE: TIDE of decreased range occurring semimonthly as the result of the moon being in quadrature. The NEAP RANGE of the TIDE is the average SEMIDIURNAL range occurring at the time of NEAP TIDES and is most conveniently computed from the harmonic constants. The NEAP RANGE is typically 10 to 30 percent smaller than the mean range where the type of TIDE is either SEMIDIURNAL or mixed and is of no practical significance where the type of TIDE is DIURNAL. The average height of the high waters of the neap tide is called neap high water or high water neaps (MHWN), and the average height of the corresponding LOW WATER is called neap low water or low water neaps (MLWN).

NEARSHORE: (1) In beach terminology an indefinite zone extending seaward from the SHORELINE well beyond the BREAKER ZONE. (2) The zone which extends from the SWASH ZONE to the position marking the start of the OFFSHORE zone, typically at WATER DEPTHS of the order of 20 m.

OFFSHORE WIND: A wind blowing seaward from the land in the coastal area.

ONSHORE WIND: A wind blowing landward from the SEA.

OVERFALLS: Breaking WAVES caused by a conflict of currents, or by the wind moving against the current.

PERIGEAN TIDAL CURRENTS: TIDAL CURRENTS of increased velocity occurring monthly as the result of the moon being in perigee (i.e., at the point in its orbit nearest the Earth).

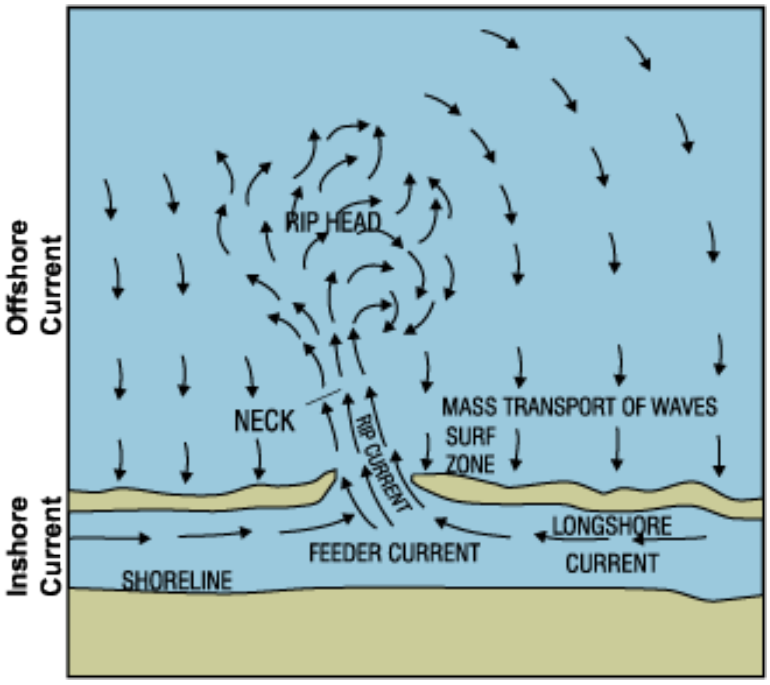
PERIGEAN TIDES: TIDES of increased range occurring monthly as the result of the moon being in perigee.

RANGE OF TIDE: The difference in height between consecutive high and low waters. The MEAN RANGE is the difference between MEAN HIGH WATER and MEAN LOW WATER. The GREAT DIURNAL RANGE or DIURNAL RANGE is the difference in height between MEAN HIGHER HIGH WATER (MHHW) and MEAN LOWER LOW WATER (MLLW). Where the type of TIDE is DIURNAL, the mean range is the same as the DIURNAL range. See Figure 11.

REFERENCE STATION: A TIDE or current station for which tidal or TIDAL CURRENT constants have previously been determined and which is used as a standard for the comparison of simultaneous observations at a second station; also a station for which independent daily predictions are given in the TIDE or current tables from which corresponding predictions are obtained for other stations by means of differences or factors.

REVERSING TIDAL CURRENT: A TIDAL CURRENT that flows alternately in approximately opposite directions with a SLACK WATER at each reversal of direction. Currents of this type usually occur in RIVERS and STRAITS where the direction of flow is more or less restricted to certain CHANNELS. When the movement is towards the SHORE, the current is said to be flooding, and when in the opposite direction it is said to be ebbing.

RIP CURRENT: A strong surface current of short duration flowing seaward from the SHORE. It usually appears as a visible band of agitated water and is the return movement of water piled up on the SHORE by incoming WAVES and wind. A rip current consists of three parts: the FEEDER CURRENT flowing parallel to the shore inside the BREAKERS; the NECK, where the FEEDER CURRENTS converge and flow through the breakers in a narrow band or "rip"; and the HEAD, where the current widens and slackens outside the breaker line.



SEA BREEZE: A breeze that blows from the SEA toward the land caused by unequal heating of land and water masses.

SEMIDIURNAL: Having a period or cycle of approximately one-half of a TIDAL DAY(12.4 hours). The predominating type of TIDE throughout the world is semidiurnal, with two high waters and two low waters each TIDAL DAY. The TIDAL CURRENT is said to be semidiurnal when there are two flood and two EBB periods each day. See Figure 11.

SEMIDIURNAL TIDE: TIDES occurring twice daily. There are two high and two lows per TIDAL DAY.

SIGNIFICANT WAVE: A statistical term relating to the one-third highest WAVES of a given WAVE GROUP and defined by the average of their heights and periods.

SIGNIFICANT WAVE HEIGHT: Average height of the highest one-third of the WAVES for a stated interval of time.

SIGNIFICANT WAVE PERIOD: Average period of the highest one-third of the WAVES for a stated interval of time.

SLACK WATER (SLACK TIDE): The state of a TIDAL CURRENT when its velocity is near zero, especially the moment when a reversing current changes its direction and its velocity is zero. The term is also applied to the entire period of low velocity near the time of turning of the current when it is too weak to be of any practical importance in navigation. The relation of the time of slack water to the tidal phases varies in different localities. In some places slack water occurs near the times of high and low water, while in other localities the slack water may occur midway between HIGH and LOW WATER.

SOUNDING: A measured DEPTH of water. On hydrographic charts the SOUNDINGS are adjusted to a specific plane of reference (SOUNDING DATUM).

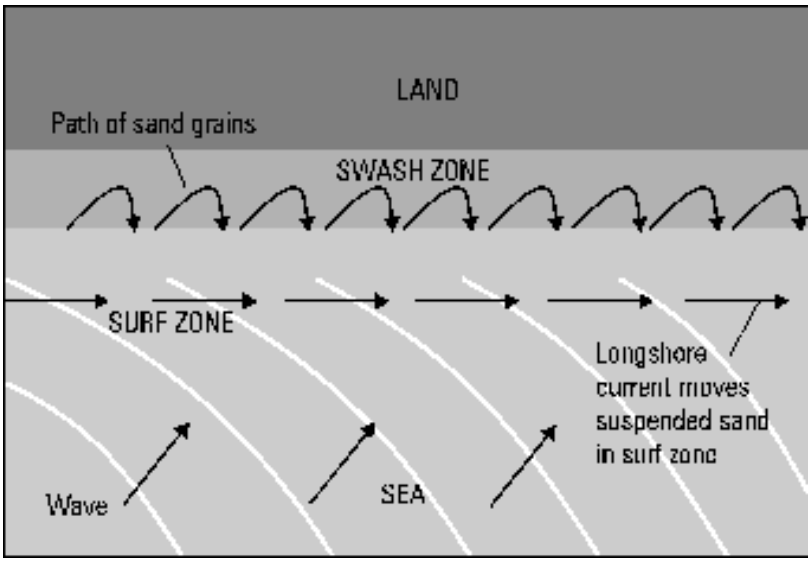
SOUNDING DATUM: The plane to which SOUNDINGS are referred. See CHART DATUM.

SPRING RANGE: The average SEMIDIURNAL RANGE occurring at the time of SPRING TIDES and most conveniently computed from the harmonic constants. It is larger than the MEAN RANGE where the type of TIDE is either SEMIDIURNAL or MIXED, and is of no practical significance where the type of TIDE is DIURNAL.

SPRING TIDAL CURRENTS: TIDAL CURRENTS of increased velocity occurring semi-monthly as the result of the moon being new or full.

SPRING TIDE: A TIDE that occurs at or near the time of new or full moon, and which rises highest and falls lowest from the MEAN SEA LEVEL (MSL).

SURF ZONE: (1) The NEARSHORE zone along which the WAVES become BREAKERS as they approach the SHORE. (2) The zone of WAVE action extending from the WATER LINE (which varies with TIDE, SURGE, set-up, etc.) out to the most seaward point of the zone (BREAKER or IMPACT ZONE) at which WAVES approaching the COASTLINE commence breaking, typically in WATER DEPTHS of between 5 m and 10 m.



SWELL: WAVES that have traveled a long distance from their GENERATING AREA and have been sorted out by travel into LONG WAVES of the same approximate period.

TIDAL WAVE: (1) A wave, in the oceans and seas, produced by tides and TIDAL CURRENTS. (2) Non-technical term in popular usage for an unusually high and destructive water level along a shore. It usually refers to STORM SURGE or TSUNAMI.

TIDE: The periodic rising and falling of the water that results from gravitational attraction of the moon and sun acting upon the rotating earth. Although the accompanying horizontal movement of the water resulting from the same cause is also sometimes called the *tide*, it is preferable to designate the latter as TIDAL CURRENT, reserving the name tide for the vertical movement.

TIDE STATION: The geographic location at which tidal observations are made. It is called a *primary tide station* when continuous observations are to be taken over several years to obtain basic tidal data for the locality. A *secondary tide station* is one operated over a short period to obtain data for a specific purpose.

TIDE TABLES: Tables which give daily predictions of the times and heights of the tide. These predictions are usually supplemented by tidal differences and constants by means of which additional predictions can be obtained for numerous other places.

TIDES, TYPES OF: The characteristic form of the tide with special reference to the relation of the DIURNAL and SEMIDIURNAL waves. Tides are sometimes classified as DIURNAL, SEMIDIURNAL and MIXED, but there are no sharply defined limits separating the groups. The tide is said to be DIURNAL when the diurnal wave predominated and only a single HIGH and single LOW WATER occur each day during the greater part of the month. The tide is SEMIDIURNAL when the semidiurnal wave predominates and two HIGH and two LOW WATERS occur each tidal day with a relatively small inequality in the HIGH and LOW WATER heights. In the MIXED type of tide the DIURNAL and SEMIDIURNAL waves are both important factors and the tide is characterized by large inequality in the HIGH or LOW WATER heights or in both. There will usually be two HIGH and two LOW WATERS each day, but occasionally the tide will become DIURNAL.

TSUNAMI: A large, high-velocity wave generated by displacement of the sea floor (such as sudden faulting, land sliding, or volcanic activity); also called seismic sea wave. Commonly misnamed TIDAL WAVE.

UNDERTOW: (1) A current below water surface flowing seaward; the receding water below the surface from WAVES breaking on a shelving beach. (2) Actually undertow is largely mythical. As the BACKWASH of each WAVE flows down the BEACH, a current is formed which flows seaward. However, it is a periodic phenomenon. The most common phenomena expressed as undertow are actually RIP CURRENTS.

UPWELLING: The process by which water rises from a deeper to a shallower DEPTH, usually as a result of OFFSHORE surface water flow. It is most prominent where persistent wind blows parallel to a COASTLINE so that the resultant EKMAN TRANSPORT moves surface water away from the COAST.

WAVE HEIGHT: The vertical distance between the crest (the high point of a WAVE) and the TROUGH (the low point).

WAVE LENGTH: The distance, in meters, between equivalent points (CRESTS or TROUGHS) on WAVES.

WAVE PERIOD: (1) The time required for two successive WAVE CRESTS to pass a fixed point. (2) The time, in seconds, required for a WAVE CREST to traverse a distance equal to one WAVE LENGTH.

WIND WAVES: (1) WAVES formed and growing in height under the influence of wind. (2) Loosely, any WAVE generated by wind.

Open Water Coastal Kayak
Trip Leader / Instructor Equipment List

A list of equipment that should be carried by a trip leader or instructor when leading a group on open water such as San Francisco Bay or the Open Coast

Life Jacket *(USCG Approved Type 3 or 5)*

- *VHF Radio*
- *Whistle*
- *Knife*
- *Compass (hand-held)*
- *Flashlight/Headlamp/Light Stick*
- *Strobe*
- *1 x Orange Smoke Flare*
- *Personal Locator Beacon*
- *Hydration Bladder*
- *Energy Gels*
- *Short Tow System*

Day Hatch

- *Lunch (including group snack)*
- *Water*
- *Minor boat repair (bituthene/butyl adhesive tape)*
- *Storm Cag*
- *First Aid Kit*
- *Additional Flares (Rocket and Smoke)*
- *Neoprene Gloves*
- *Balaclava/Skull Cap*

Main Hatches

- *Group Shelter*
- *Survival Blanket*
- *Extra Water*
- *Dry Thermal Wear*
- *Comprehensive Repair Kit*
- *Float Bags*

Boat

- *Spares Paddles*
- *Pump*
- *Paddlefloat*
- *Chart/Map*
- *Float Notes*
- *Deck Compass*
- *Long Tow System (waist or deck mounted)*
- *Short Tow System*

Body

- *Spray Skirt*
- *Helmet*
- *Splash Jacket*
- *Wetsuit or Dry Suit*
- *Thermal Layers*
- *Booties (suitable for swimming and climbing on rocks)*

Items in RED should be considered mandatory R&O Instructors and for the ACA Instructor Development Workshop / Instructor Certification Exam

8. Book List

Abrahams, A., & Collins, D. (1998)
Examining and extending research in coach development.
Quest, 50, 59-79.

Abraham, A., Collins, D. (July 1999)
The Coaching Toolbox: A tool for coaches, coach educators and sport psychologists.
Paper presented at the 4th Annual Congress of the European College of Sport Science, Rome.

Alderson, Doug & Pardy, Michael
Sea Kayaker Magazine's Handbook of Safety & Rescue
Ragged Mountain Press – ISBN 0-07-138890-7

Ashworth, Sarah & Mosston, Mukta (2001)
Teaching Physical Education
Allyn & Bacon - ISBN 0205340938

British Canoe Union
Coaching Handbook
Pesda Press – ISBN 0-9547061-6-1

Brown, G
Sea Kayak – A Manual for Intermediate and Advanced Sea Kayakers
Pesda Press – ISBN 0-95477061-7-X

Broze, Matt & Gronseth, George
Sea Kayaker's Deep Trouble
International Marine/Ragged Mountain Press – ISBN 978-0070084995

Bull, C; Davis, R; Roscoe, D; Roscoe, J (1994)
Physical education & the Study of Sport
Mosby - ISBN 0 7234 1972 8

Burch, David
Fundamentals of Kayak Navigation: Master the Traditional Skills and the Latest Technologies
Starpath Publications – ISBN 9-7809140-255-28

Cabral, P, Carpenter, F & Crisfield P (1996)
The Successful Coach
Guidelines for coaching practice

NCF Leeds

Cassidy, S; University of Salford (2004)
Learning Styles; An Overview of Theories, Models and Measures
Educational Psychology
Vol 24, # 4 Taylor and Francis - ISBN 0144 3410

Cooper, D
Sea Kayak Handling
Pesda Press – ISBN 978-906095-18-5

Cooper, D
Rough Water Handing – Essential Knowledge for Intermediate and Advanced Sea Kayakers
Pesda Press – ISBN 978-1-906095-34-5

Cross, Neville & Lyle, John (1999)
The Coaching Process
Principles and practice for sport.
Oxford Butterworth-Heinemann

Cunningham, Christopher
Sea Kayaker's More Deep Trouble
International Marine/McGraw-Hill Education – ISBN 978-0-07-177009-5

Dennison, B., & Kirk, R. (1990).
Do, Review, Learn, Apply: A simple guide to experiential learning.
Oxford: Blackwell Education - ISBN 0-631-16838-9

Dowd, John
Sea Kayaking – A Manual for Long Distance Touring
Greystone Books - ISBN 1-55054-976-6

Ferrero, Franco
Sea Kayak Navigation
Pesda Press – ISBN 978-1-906095-03-1

Goddard, D & Neumann, U (1993)
Performance Rock Climbing
Stackpole Books - ISBN 0 8117 2219 8

Guillon, Laurie
Kayak and Canoe Games

Menasha Ridge Press – ISBN 0-89732-194-4

Henderson, Dan
Sea Kayaking – Basic Skills, Paddling Techniques, and Trip Planning
The Mountaineers Books – ISBN 978-1-59485-340-1

Hutchinson, Derek
The Complete Book of Sea Kayaking
A & C Black – ISBN 0-7136-3835-4

Hutchinson, Derek
Guide to Sea Kayaking
Pacific Search Press – ISBN 0-931397-00-6

Killen, Ray
Simple Kayak Navigation – Practical Piloting for the Passionate Paddler
Ragged Mountain Press/McGraw-Hill – ISBN 0-07-146794-7

Lee, D., and Magill, R. (1983).
The locus of contextual interference in motor-skill acquisition.
Journal of Experimental Psychology:
Learning, Memory, and Cognition, 9, 730-746.

Lee, T.D., Swinnen, S., and Serrien, D. (1994).
Cognitive effort and motor learning.
Quest, 46, 328-344.

Lull, John
Sea Kayaking Safety & Rescue
Wilderness Press - ISBN 978-0-89997-476-7

Lyle, John
Sport Coaching Concepts
'A framework for coaches' behavior'
ISBN 0-415-26 158-9

Martens, Rainer (1987)
Coaches Guide to Sports Psychology
Human Kinetics USA - ISBN 0873220226

Martens, Rainer (1997)
Successful Coaching

Human Kinetics USA - ISBN 088011 666 8

Maslow, Abraham 2nd Edition (1954)
Motivation and Personality
Harper and Row Inc.

Ruse, Dave & Collins, Loel
Canoe & Kayak Games
Rivers Publishing UK – ISBN 0-9550614-0-7

Seidman, David
The Essential Sea Kayaker – A Complete Course for the Open Water Paddler
Ragged Mountain Press/McGraw-Hill – ISBN 0-877242-305-9

Schmidt, R.A. (1991).
Motor Learning and Performance: From Principles to Practice.
Champaign, Ill.: Human Kinetics.

UK Sport (2001)
The U.K. Vision for Coaching.
A Strategy into the 21st Century
London

Washburn, Randel
The Coastal Kayaker's Manual
The Globe Pequot Press – ISBN 1-56440-153-7

Williams, A.M., Davids, K., & Williams, J G. (1999).
Visual perception and action in sport.
London: Routledge.

Tortora, G, J; Gabbrowski, s (1996) 8th Edition
Principles of Anatomy and Physiology
Harper Collins - ISBN 0 673 99354 X

Lull, John; 2008.
Sea Kayak Safety & Rescue
Wilderness Press

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