Fieldcraft for the Unplanned

A Practical Guide to Emergencies & Survival

Contents

Disclaimer & Scope

0.1 Legal, Medical, and Jurisdictional Notes

This book is for general information and education. It is not a substitute for professional medical, legal, or technical advice, diagnosis, or treatment. Use your judgment, verify information from authoritative sources, and seek qualified help when in doubt.

- Not medical advice: Field care guidance is written for lay responders. Get certified training (e.g., CPR/AED, bleeding control, wilderness first aid) and follow local protocols. Do not perform procedures beyond your training and equipment.
- Not legal advice: Laws vary widely by country, state, and municipality (e.g., trespass, hunting/fishing, radio use, signaling devices, fire bans, knives/tools, vehicle and road laws). You are responsible for knowing and following local laws.
- Ethics and legality: This book avoids illegal methods and destructive techniques. If an action would require bypassing security, violating property rights, or breaking the law, do not do it.
- Good Samaritan concepts: Some jurisdictions offer limited protections to bystanders who render aid in good faith within the scope of their training. These protections and limits vary—consult local guidance.

By using this material, you accept all risks and agree that the authors and publishers are not liable for losses, injuries, or damages resulting from its use or misuse.

0.2 When to Call for Help

If you or someone nearby has any of the following, call emergency services immediately (e.g., 911/112/999) and follow dispatcher instructions:

- Uncontrolled or massive bleeding, major trauma, or amputation
- Chest pain/pressure, shortness of breath, or signs of heart attack
- Stroke signs (FAST: face droop, arm weakness, speech difficulty, time urgent)
- Severe allergic reaction/anaphylaxis (trouble breathing, swelling, hives)
- Altered mental status, confusion, or loss of consciousness
- Serious head/neck/spine injury or high-energy mechanism (fall, collision)
- Severe burns, electrical/chemical burns, or burns to face, hands, groin
- Eye injury—especially chemical exposures or penetrating trauma
- Heat stroke, severe hypothermia, or unresponsive from environmental exposure
- Seizure lasting >5 minutes, repeated seizures, or first-time seizure
- Suspected envenomation after snakebite with worsening symptoms
- Dehydration in infants/elderly with lethargy, no urination, or sunken eyes
- Any situation that feels beyond your capability or is rapidly worsening

What to communicate when you call:

- Location: best described with plain address and landmarks; include coordinates (Lat/Long or UTM/MGRS) if remote

- Nature of the problem and hazards present (fire, gas, downed lines, unstable structure)
- Number of people, ages, their conditions, and immediate life threats
- Actions taken so far (e.g., bleeding controlled, airway open, epi given)
- Callback number, best access route, and any gate/lock info

If you cannot call: prioritize safety and signaling. Use sound/light signals, pre-arranged radio plans, or a personal locator beacon/satellite messenger if available. Move to a safer location if remaining is life-threatening.

Consent: If a patient is alert, ask permission before helping. If unresponsive or a child without a guardian present, many jurisdictions recognize "implied consent" for lifesaving aid. Stop if a competent adult refuses care.

Scope and intended audience:

- Focus: practical, legal, non-destructive skills for preparedness, emergencies, and short-term survival for laypersons and small groups.
- Exclusions: specialized professional tactics (technical rope rescue, explosives, law-enforcement procedures), invasive medical care beyond lay training, and illegal methods of access or movement.

Competency, training, and equipment:

- Practice skills before emergencies and maintain equipment in working order.
- Use appropriate personal protective equipment (gloves, eye protection) and avoid exposure to bodily fluids, smoke, chemicals, electricity, and unstable structures.
- Replace consumables (batteries, meds, water treatment, first aid) per expiration or after use.

Environmental variability and risk:

- Terrain, weather, wildlife, and infrastructure differ by region. Adapt recommendations to local conditions and your abilities.
- Some techniques carry inherent risk. If conditions exceed your training or tools, pause, reassess, and seek help.

Accuracy and updates:

- Content reflects current best practices at the time of writing but may change. Cross-check critical steps with up-to-date, authoritative sources (e.g., local EMS guidance, park/land management advisories, manufacturer manuals).

0.3 Scenario

Scenario (Roadside crash): You arrive first. Two cars, one person seated, bleeding from forearm; fuel smell faintly present. Decisions: Approach or hold? Consent? Move the person or not? Call before touching? Outcome: You park safely, hazards on, place a triangle, call 911 with location and hazards, ask the patient if you may help, glove up, control bleeding with pressure, keep them warm, and do not move them without immediate danger. Lessons: - Scene safety and consent come first - You are protected by Good Samaritan concepts only within your training and local laws - Document times and actions for handoff Drill: Write a 3-line script you'll say on arrival and when asking for consent.

How to Use This Book

0.4 What This Is

This is a practical, online-first guide you can skim in minutes or study in depth. Each chapter starts with what to do, then adds why and how. Appendices provide printable quick-reference.

0.5 Icons

To keep callouts consistent and readable across browsers, we use simple Unicode with ASCII fallbacks. Use these markers when drafting content and keep the wording short and action-focused.

- Tip — ALT: [tip]
- Note — ALT: [note]
- Caution — ALT: [caution]
- Danger — ALT: [danger]
- First Aid — ALT: [med]
- Legal — ALT: [legal]
- Checklist — ALT: [x] / [ ]
- Gear — ALT: [gear]

Formatting pattern (choose one of the two styles):

1) Inline callout > Caution: Hot exhaust can ignite dry grass.

2) Label prefix on its own line Caution

- Park on bare soil or pavement before working under a vehicle.

0.6 At-a-Glance Cards

Each major section references matching quick cards in Appendices. Use them for training and as "just-in-time" refreshers. See: Appendices → At-a-Glance Cards, Signal Library, Knots, Water Dosages, and Checklists.

0.7 Navigation & Structure

- Parts I–XII are topic clusters. Skim "Intros" and jump to the task you need.
- Chapters are short, scannable modules with headings you can link to directly.
- Appendices contain single-page references intended for printing or offline copies.

0.8 What We Don't Use

- Color tabs: Omitted for the web. Headings, icons, and clear links replace color coding.

0.9 Checklists

- Use `[ ]` for an empty box and `[x]` when demonstrating a completed item.
- Keep items single-action and verifiable (no multi-step bullets in one line).

Example: - [ ] Water: container, pre-filter, treatment method - [ ] Light: headlamp, spare batteries - [ ] Comms: charged phone, offline map, PACE plan card

0.10 Skill Levels

To set expectations, we may label tasks: - Basic — safe for most readers after a quick read-through - Intermediate — practice recommended before real use - Advanced — requires training, supervision, or specialized gear

0.11 Measurements & Conventions

- Units: SI first, US customary in parentheses when useful (e.g., 1 L (34 fl oz)).
- Time: 24-hour format for logs and plans; use local time zone.
- Coordinates: Show format and datum (e.g., 37.7749° N, 122.4194° W; WGS84) and include UTM/MGRS when relevant.
- Terms: The first appearance of a model or acronym expands in-line (e.g., PACE: Primary, Alternate, Contingency, Emergency).

0.12 Safety First

When a step trades time for safety, we prefer safety. If a task exceeds your training, stop, stabilize, and seek help. See: Disclaimer & Scope.

0.13 Offline Use

- Save important chapters as PDFs or print quick cards for kits.
- Consider a preloaded offline map app and locally saved checklists.

0.14 Contributing & Feedback

If you spot a mistake or have a practical improvement, open an issue or submit a concise example that improves clarity and safety. Real-world observations matter.

0.15 Scenarios

> Scenario (Urban outage, commute): Power fails at dusk. Elevators stop, data crawls, streets clog. Your GHB is under the desk. Decisions: Stairwell vs wait; route to busier exit; call or text; conserve battery; walk vs rideshare. Outcome: You take stairs, text a short WHO/WHERE/WHEN/WHAT/INTENT update, switch to offline map, walk a known route with headlamp on low. Lessons: - PACE: voice → text → radio → rendezvous - Offline maps + battery bank random scrolling - Keep light and whistle on-person Drill: Walk your route once in daylight; save an offline map and set a one-page PACE card.
>
> Scenario (Trail day, light rain): Your phone is at 20%. A friend twists an ankle 3 km from trailhead. Decisions: Duty-cycle phone; signal; split or stay; shelter now or move. Outcome: You STOP, build a quick A-frame, send a timed text, then hobble together on a handrail to a

known rendezvous. Lessons: - Safety, shelter, signaling before distance - “One page” checklists reduce flailing Drill: Pack your bag to hit the checklists without digging.

Survival Priorities

0.16 Rule of 3s

Memory aid, not a law. Priorities change with conditions.

- Airway/Breathing: ~3 minutes without adequate oxygen. Address life-threats first (see: MARCH-E).
- Shelter/Thermal: ~3 hours exposed to cold/wet/wind or extreme heat without protection.
- Water: ~3 days without water (much less in heat/exertion).
- Food: ~3 weeks without food (not a near-term priority unless stranded long).

Tip: Wet + Wind + Cold is the fastest killer for most hikers. "Wet 4°C/40°F with wind" can be more dangerous than "−7°C/20°F dry and calm."

Caution: Don't chase water or food first and neglect bleeding control or hypothermia prevention.

First Aid: If there's major bleeding, control it immediately; open/maintain the airway; check breathing. Then prevent heat loss before searching for water.

Example — Lost day-hike, drizzle, 8°C/46°F: - STOP, put on insulation and rain shell, get under a tree well or tarp; keep moving just enough to stay warm. - Signal (whistle/flash), then plan water only after shelter and signaling are handled.

0.17 STOP

A fast reset to avoid panic and bad decisions.

1) Stop: Freeze your feet. Sit or kneel. Set a 2-minute timer. Do six 4-4-8 breaths (inhale 4, hold 4, exhale 8).
2) Think: State your goal out loud: "I want to be found safe and uninjured." Note constraints (injury, weather, sunset, battery).
3) Observe: Check self, companions, and environment. Map, compass, recent landmarks, weather trend, cell/GPS status, time to dark.
4) Plan: Pick the next right action that reduces risk and increases options (shelter, signaling, comms, water). Set a turn-back time or check-in.

Note: Pair STOP with the Rule of 3s. If cold/wet/windy, shelter and thermal management outrank movement.

Example — Off-trail on a ridge, fog rolling in: - Stop: Layer up, eat a quick snack for heat, timer 2 minutes. - Think: Goal = regain a known handrail (trail/stream). Constraint = 90 minutes to sunset. - Observe: Wind from W, ridge runs N-S; last cairn 15 minutes south; phone at 42%, offline map loaded. - Plan: Move south along the ridge (handrail) for 20 minutes to find cairn; if not found by 20, build wind break, signal, reassess.

0.18 OODA

Iterative loop to keep decisions adaptive under uncertainty.

- Observe: What is actually happening? Sensors: eyes/ears/skin, tools: map, compass, GPS, weather.
- Orient: Fit observations to terrain, experience, and current constraints (injury, team, time, gear).
- Decide: Choose the best action you can justify now. Good enough beats perfect later.
- Act: Do it, then immediately re-observe and repeat the loop.

Tip: Pre-plan "if/then" triggers (e.g., "If visibility $<$ 100 m, switch to handrail navigation"). It speeds the loop and prevents paralysis.

Caution: Beware fixation. If a plan isn't working on the ground (no trail where the map shows one), re-orient and choose a new action.

Example — Urban blackout at night: - Observe: Power out 3 blocks; cell data poor; elevators down; traffic lights dead. - Orient: Heat index high; elderly neighbor on oxygen; your car is low on fuel. - Decide: Check neighbor; stabilize them; conserve phone; text family status with check-in time; avoid driving. - Act: Execute, then reassess in 60 minutes or if conditions change.

0.19 PACE Communications Plan

Have multiple, pre-agreed ways to reach each other. Define timing and message format.

- Primary: Most reliable, easiest (e.g., phone call).
- Alternate: Next best if primary fails (e.g., SMS/text or messaging app).
- Contingency: Requires more effort/coordination (e.g., FRS/GMRS Ch 3, PL tone 0, check-ins on the hour).
- Emergency: Last resort to signal status/need (e.g., meet at "North Library lot" at 19:00; leave note; PLB/SOS if life-threatening).

Note: Standardize a short message format: WHO / WHERE / WHEN / WHAT / INTENT.

Examples - Family local: - P: Call; A: SMS; C: GMRS Ch 3, on-the-hour 5-min watch; E: Meet HOME-2 (Aunt's) 20:00. - Sample: "ANDREW / HOME / 18:30 / POWER OUT, NEIGHBOR OK / STAY, NEXT 21:00." - Hiking party: - P: In-person within line of sight; A: Whistle 1=where are you?, 2=come to me, 3=distress; C: FRS Ch 1, 10-min windows at 10:00/12:00/14:00; E: Trailhead board 16:00, leave plan with ranger. - Remote travel: - P: Sat-messenger preset "OK" every evening; A: SMS when cell available; C: APRS beacon hourly; E: PLB SOS only for life threats.

Checklist — Minimum PACE card - Names and roles - Channels and tones - Check-in times and durations - Message format (WHO/WHERE/WHEN/WHAT/INTENT) - Rendezvous points (primary/alternate)

0.20 Scenarios

Scenario (Temperate forest, fog): The trail vanishes in cloud. Wind chills sweat. Phone at 36%. Decisions: Push forward vs STOP and reset; water now vs shelter; signal cadence. Outcome: STOP → layer up → small wind break → whistle schedule; you become findable and warm before worrying about water. Lessons: - Rule of 3s: thermal outranks water/food - STOP resets panic into action Drill: Practice a 2-minute STOP under a cold fan.

Scenario (Urban blackout): Power down, cell data jammed, elderly neighbor on oxygen. Decisions: Check neighbor vs drive; signal family; power priorities. Outcome: You check neighbor, send WHO/WHERE/WHEN/WHAT/INTENT by SMS, set hourly check-ins, and avoid risky driving. Lessons: - PACE plan + short message format - Battery discipline preserves options Drill: Write your family's 1-line message template.

Part I

Part I — Mindset, Risk & Decision-Making

Chapter 1

Survival Psychology

1.1 Overview

Mindset drives outcomes under pressure. This chapter builds the habits that keep you thinking clearly, choosing well, and acting decisively when conditions are uncertain or dangerous. Pair these skills with the priorities in Survival Priorities for maximum effect.

1.2 Acute Stress Response

Your body's alarm system (adrenaline, cortisol) is adaptive—but untrained, it can degrade judgment and fine motor skills.

What you may feel: - Racing heart, shaky hands, dry mouth, narrowed vision, muffled hearing, time "slowing." - Thinking traps: panic, fixation on one detail, black-and-white choices.

Regulation tools (pick one, do it for 60–120 seconds): - Box breathing: inhale 4, hold 4, exhale 4, hold 4. Repeat x6–10. - Physiological sigh: short inhale + longer inhale, slow exhale through mouth; repeat x3–5. - 5–4–3–2–1 grounding: name 5 sights, 4 touches, 3 sounds, 2 smells, 1 taste.

Tip: Say out loud, "Stress response detected; I can still choose." Labeling the state creates distance from it.

1.3 Managing Fear

Fear narrows focus; use it, don't let it use you.

- Self-talk: "This is survivable. One step at a time."
- Micro-goals: "Put on shell. Get behind wind break. Drink 200 mL."
- Posture cue: Chin up, shoulders down, widen stance; scan deliberately left-to-right.
- Fuel the brain: small sip, small bite if safe—stabilizes mood and cognition.

Note: Pair fear control with a quick plan (STOP or OODA) so calm translates into useful action.

1.4 Tunnel Vision

Stress compresses attention. Force your aperture wider.

- "120° arc scan": Turn head left-to-right, near–mid–far, twice.
- "Up/Down check": Look up for hazards (deadfall, lines), down for footing.
- "Team cross-check": Buddy calls out hazards you missed; acknowledge and repeat back.

- Touch check: Tap critical kit—phone, map/compass, light, first aid, warmth—so you remember what's available.

Tip: Set a timer to re-scan every 10 minutes in poor visibility or fast-changing conditions.

1.5 Decision Paralysis

When choices feel overwhelming, constrain the problem.

- Timebox: "Pick a course in 2 minutes." Use an alarm. Decide, then monitor.
- Satisficing: Choose the first option that clearly improves safety. Perfection later.
- Premortem: "If this fails, why?" Adjust the plan before acting.
- Heuristics: Pre-commit small rules. Example: "If we haven't found the trail in 20 minutes, we stop and shelter."

Checklist — Anti-Paralysis - Set 1–2 measurable objectives - Choose next step that reduces risk now - Set a check time and a backstop (turnaround) - Communicate plan to self/party (say it out loud)

1.6 STOP

A four-step reset to re-align actions with priorities.

1) Stop: Freeze your feet; breathe down your pulse. Use a 2-minute timer.
2) Think: Purpose (survive unharmed), constraints (injury, weather, daylight, battery), assets (gear, skills, companions).
3) Observe: People (injuries), place (terrain, shelter), things (gear inventory), time (to dark, to weather change).
4) Plan: Next right action + check time + success/failure criteria.

Example — Separated from group in mixed forest, drizzle, 9°C/48°F: - Stop: Shell on, hat/gloves; timer 2 minutes; box breathing. - Think: Goal = be findable; Constraint = cooling, 2 hours to dusk. - Observe: Signal (whistle 3 blasts), choose high-contrast tarp spot near handrail (stream), phone 36% with offline map. - Plan: Build quick A-frame, set mirror/flashlight ready; listen/watch 10 minutes; if no contact, move 200 m to stream (handrail), stay put, signal every 10 minutes.

1.7 OODA

Keep cycling decisions with reality.

- Observe: Gather facts—weather shift, ground truth vs map, teammate status.
- Orient: Fit into your mental model; update it (e.g., trail washed out => handrail navigation).
- Decide: Pick a course with the best safety/time payoff now.
- Act: Execute; then re-observe on a set interval (5–15 minutes, or after key checkpoints).

Tip: Write down two options and why you chose one. This creates a breadcrumb for later review if you need to pivot quickly.

Caution: Plan continuation bias kills—don't keep pushing a bad plan because you're invested. If conditions violate your thresholds, switch plans.

First Aid: For casualties, run a micro-OODA every 2–5 minutes: bleeding, airway, breathing, heat, mental status.

1.8 Practice Drills (Short, Useful)

- 90-second reset: Any time you feel rushed, do STOP with box breathing.
- Timed choices: Pick a route or action in 120 seconds; implement, then review.
- Kim's Game: Study 10 items for 30 seconds, then recall—improves observation under stress.

1.9 Common Cognitive Traps (and Counters)

- Normalcy bias: "This will pass." Counter: Ask, "What would make me wrong?"
- Plan continuation: "We've already invested." Counter: Pre-set abort criteria.
- Anchoring: Fixating on first info. Counter: Seek disconfirming evidence.
- Groupthink: Silence agreement. Counter: Assign a red-team voice.

1.10 Key Takeaways

- You can regulate your physiology quickly; practice one breathing tool until it's automatic.
- Collapse big problems into the next safe, useful action; timebox decisions and review.
- Use STOP for rapid resets and OODA for ongoing navigation of uncertainty.
- Write down thresholds and backstops in calm moments; follow them when stressed.

1.11 Cross-Links

- Survival Priorities → Rule of 3s: ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP: ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA: ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan: ../front-matter/03-survival-priorities.html#pace-communications-plan

1.12 Scenarios

Scenario (Fog ridge): Wind bites; visibility 30 m; your pulse spikes. Decisions: Run downslope vs STOP and breathe; push time vs set a turnaround. Outcome: Two minutes of box breathing; STOP → observe wind and terrain; plan a measured backtrack with a 20-minute check. Lessons: - Physiology control first - Next safe, useful action beats perfection Drill: Box-breathe while reading a map until your hands stop shaking.

Chapter 2

Risk Assessment

2.1 Overview

Risk isn't eliminated; it's traded. Your job is to surface the biggest threats quickly, choose controls that reduce harm, and set clear thresholds that trigger plan changes. Tie these decisions to the survival priorities so you're solving the right problem first.

2.2 Rapid Hazard Triage

Start wide, then narrow. Address life-threats, then plan.

- People: bleeding, airway/breathing, consciousness, exposure risk.
- Place: weather (now/next), terrain traps (cliffs, avalanche, flood), route options.
- Things: gear status (light, warm layers, water, comms), vehicle condition if applicable.

First Aid: Run MARCH-E first for any injured person, then continue assessment.

2.3 Risk Matrix

Simple, fast way to grade hazards by expected harm.

- Likelihood: Unlikely / Possible / Likely
- Impact (Severity): Minor / Serious / Catastrophic
- Combine to flag: Green (proceed), Amber (proceed with controls), Red (stop or change plan).

Tip: You don't need numbers. A quick "Amber/Red" label triggers controls or postponement.

2.4 Go/No-Go Thresholds

Write down the lines you will not cross—before you're at the line.

- Time to dark: "If off trail 90 minutes before sunset, stop to shelter."
- Weather: "If thunder $< 30/30$ rule or winds > 25 kt on ridge, descend."
- People: "If anyone is hypothermic or injured beyond basic care, halt movement and signal."
- Gear: "If we lose primary light or comms, switch to contingency route back."

Caution: If any Red threshold is met, stop arguing. Pivot to the pre-agreed plan.

2.5 Solo vs Group Decisions

Decide how you'll decide—before decisions get hard.

- Designate a leader (can rotate by domain) and a red-team voice to challenge assumptions.
- Closed-loop comms: Each tasking is repeated back and acknowledged.
- Short briefs: "Purpose, key tasks, end state" before movement.
- Check-backs: Every 15–30 minutes or at terrain features, confirm status vs plan.

2.6 Leader's Intent

Boil the plan to its essence so teammates can improvise if separated.

- Purpose: Why are we doing this?
- Key Tasks: The few critical actions that must happen.
- End State: What success looks like (location, time, condition).

Example — Day hike with incoming storm: - Purpose: Return everyone to trailhead safely before storm. - Key Tasks: Stay on handrail ridge; regroup at saddles; shelter if thunder heard. - End State: At vehicle by 15:30, all dry and uninjured.

2.7 Contingency Triggers

Write explicit "if/then" branches tied to observations.

- If visibility < 150 m $\rightarrow$ Switch to handrail navigation and buddy tether.
- If creek $>$ mid-shin or opaque $\rightarrow$ No crossing; choose higher route.
- If pace < 2 km/h by 14:00 $\rightarrow$ Shift to nearest shelter site; signal schedule on the hour.
- If battery $< 20\%$ $\rightarrow$ Airplane mode + text check-ins only on the hour.

Checklist — Quick GAR (Green/Amber/Red) - People: Warm? Hydrated? Or injured/cold? - Environment: Weather window stable? Terrain hazards? - Equipment: Light? Layers? Comms? Navigation? - Plan: Go/No-Go thresholds defined? Decision points marked?

Example — River crossing decision (shoulder-season): - Observe: Water 8–10°C, knee-deep but fast, opaque, no safe exit downstream. - Orient: Cold shock risk + entrapment hazard; one person is cold already. - Decide: No-Go. Walk upstream to bridge; if none by 60 minutes, shelter and signal. - Act: Reverse to warm, wind-sheltered spot; hot drink; dry layer; reassess route.

2.8 Scenario

Scenario (Desert wash): A usually dry arroyo runs brown after storms. Daylight is fading. Decisions: Cross now vs detour; risk matrix labels? Backstop time? Outcome: You label it Red (high impact), set a 60-minute detour cap, choose higher ground, and reach camp late but dry. Lessons: - GAR language makes stop/Go obvious - Decision points + backstops prevent creeping risk Drill: Write 3 Go/No-Go thresholds you'll actually follow.

2.9 Key Takeaways

- Decide in advance what conditions trigger a stop, detour, or shelter decision.
- Use simple Green/Amber/Red language to make risk visible and actionable.
- Share Leader's Intent so teammates can improvise toward the same end state.
- Write clear if/then triggers tied to observable conditions; rehearse them.

2.10 Cross-Links

- Survival Priorities → Rule of 3s (set correct priorities): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before deciding): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate decisions): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (check-ins, alternates): ../front-matter/03-survival-priorities.html#pace-communications-plan

Chapter 3

Situational Awareness

3.1 Overview

Awareness buys time, and time buys options. Build fast baselines, spot meaningful anomalies, and pre-plan branches so you can pivot early. Couple awareness with the STOP reset and the OODA loop to translate observation into action.

3.2 Baselines

Know what "normal" looks like so you notice "not normal."

- People: Typical foot traffic, behavior, clothing for weather/time.
- Place: Usual sounds, lighting, vehicle flow, open/closed spaces.
- Time: What changes by hour/day/season.

Tip: Build a 10-second baseline on arrival: stand still and listen first, then scan.

3.3 Anomalies

An anomaly is anything that doesn't fit the baseline; it's not automatically a threat.

- Categorize: Harmless oddity vs. potential hazard vs. opportunity (e.g., shelter).
- Prioritize: Proximity, momentum toward you, ability to affect you.
- Verify: Cross-check with a second sense or a teammate callout before acting.

Note: "Left of bang" thinking—notice precursors before problems fully form.

3.4 What-If Trees

Pre-planning branches reduces panic and accelerates good choices.

- Make 2–3 branches for the top risks: weather turn, injury, separation, comms failure.
- Tie branches to triggers and actions (PACE and decision points).

Example — Urban power outage: - If elevators stop → Take stairs down now, don't wait; rendezvous at lobby desk. - If cell data drops → Switch to SMS with WHO/WHERE/WHEN/WHAT/INTENT; conserve battery. - If street becomes congested → Avoid intersections; move via side streets; meet at Park-N garage L2.

3.5 Light Discipline

Be seen when helpful, be invisible when not.

- Night navigation: Angle light down; use lowest usable brightness; prefer warm/red modes.
- Indoors: Cup light to reduce spill; bounce off walls/ceilings for diffuse light.
- Signaling: Switch to high output and strobes only when you intend to be found.

Caution: White light ruins night vision; protect a designated "no-light navigator" if possible.

3.6 Sound Discipline

Sound travels far in quiet environments; noise draws attention and masks other cues.

- Movement: Place feet softly; control loose gear; avoid clacking metal.
- Comms: Pre-brief hand signals; keep radio traffic short and plain.
- Tools: Pad clattery items; secure zippers and straps; stow loose carabiners.

3.7 Scent Discipline

Odors carry on wind and stick to clothing and gear.

- Food: Cook downwind and away from sleeping areas; seal trash.
- Smoke: Minimize in high-risk or low-viz environments; avoid inside shelters.
- Fuels/Chemicals: Store tightly sealed; avoid spills; don't open near living areas.

Checklist — 5×5×5 Scan - Every 5 minutes: pause 5 seconds, scan 5 directions (front, left, right, up, back) at 5 distances (immediate, 5 m, 25 m, 100 m, horizon) if visibility allows.

Examples - Trail cresting to leeward: Baseline = wind noise up, temps down; Anomaly = fresh cornice cracks → back off ridge by 10 m. - Parking garage at night: Baseline = cars parked, echoing steps; Anomaly = idling vehicle without driver → choose alternate exit, keep distance, observe.

3.8 Scenario

Scenario (Bus stop at night): A man paces, talking loudly to no one. A car idles with lights off near your route. Decisions: Wait vs move; cross early vs commit; call someone now vs later. Outcome: You cross early to a lit store, call a friend on speaker, and take a longer, well-lit route. Lessons: - Baseline/Anomaly → distance and alternatives - Pre-decided exits make choices fast Drill: On arrival anywhere, speak your 10-second baseline aloud.

3.9 Key Takeaways

- Take 10 seconds to build a baseline on arrival; re-scan on a timer in dynamic settings.
- Label anomalies and verify before acting; prioritize by proximity and momentum toward you.
- Pre-build 2–3 what-if branches for top risks; tie them to triggers and actions.
- Control light, sound, and scent signatures deliberately; don't let them control you.

3.10 Cross-Links

- Survival Priorities → Rule of 3s (prioritize shelter/thermal vs movement): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset to avoid panic): ../front-matter/03-survival-priorities.html#stop

- Survival Priorities → OODA (cycle observe→act): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (standard callouts/check-ins): ../front-matter/03-survival-priorities.html#pace-communications-plan

Chapter 4

Ethics & Legal Considerations

4.1 Overview

In emergencies, good intentions are not enough—your decisions must also be safe, ethical, and lawful. This chapter frames how to help without creating new casualties or legal problems, and how to escalate to authorities wisely.

4.2 Rendering Aid

Do the most good without becoming a casualty yourself.

- Scene safety first: power lines, traffic, fire/smoke, structural instability, hazardous atmospheres.
- PPE: gloves, eye protection if available; avoid contact with bodily fluids when possible.
- Priorities: life-threats first (bleeding, airway, breathing), then thermal protection.

First Aid: Follow your training and local protocols; escalate early when red flags appear (see Disclaimer).

4.3 Consent

Ask if the person wants help when they are alert and capable of deciding.

- Expressed consent: "I can help stop the bleeding—okay?"
- Implied consent: If unresponsive, confused, or a minor without a guardian, many places recognize implied consent for lifesaving aid.
- Respect refusal: If a competent adult refuses care, respect it; reduce hazards, call help, and document what you observed.

4.4 Good Samaritan Laws

These laws often protect lay rescuers who act in good faith within their training. Limitations vary.

- Generally protected: Basic aid given without gross negligence or expectation of payment.
- Not protected: Acting far beyond training, reckless behavior, or abandoning a patient once you start care (where duty arises).

Legal: Laws differ by jurisdiction; verify your local rules. This book is not legal advice.

4.5 Property and Trespass

Respect property rights. In rare, immediate life-threat scenarios, some places allow necessity to justify limited entry—this is narrow and fact-specific.

- Best practice: Seek permission from the owner/manager first. If unreachable, involve authorities (fire, police) whenever possible.
- Documentation: If you enter to save life (e.g., pull someone from visible danger), note time, reason, what you did, and your contact info for the owner/authorities.
- Damage: Use the least destructive means consistent with safety. Stop once the life-threat is over.

Note: Pre-incident planning (meeting points, keys with trusted neighbors, lock boxes) removes the need for risky choices later.

4.6 Avoiding Illegal Methods

This guide avoids teaching security bypasses, destructive entry techniques, or any illegal activity.

- Movement & access: Prefer owner consent, locksmiths, roadside assistance, or authorities. Use manufacturer's documented overrides where applicable and legal.
- Signaling & radios: Follow local regulations for transmit power, bands, and licensing. Use FRS/GMRS per rules; don't interfere with emergency channels.
- Harvesting food/water: Follow local laws and safe/ethical practices. When in doubt, don't.

Caution: "Emergencies" do not make all actions legal. Necessity is limited, and misjudgment may carry civil/criminal liability. When feasible, call authorities first.

Examples - Severe storm, locked community room as shelter: Call site security/management and emergency services; shelter under covered exterior or interior hallway if safe; use non-destructive sheltering until help arrives. - Vehicle blocking fire lane in evacuation: Report via authorities; do not attempt to move vehicles you don't control unless directed and trained.

Checklist — Ethical Decision Snapshot - Is there an immediate life threat that cannot wait? - Have I removed/mitigated my own risk first? - Do I have consent (or does implied consent apply)? - Is there a legal, less destructive alternative (call, signal, wait for authorities)? - Did I document key details if I intervened?

4.7 Key Takeaways

- Your safety first; you cannot help if you become a casualty.
- Seek consent when possible; implied consent is narrow and jurisdiction-specific.
- Prefer legal, non-destructive options; involve authorities early for access and movement.
- Document reasons and actions when you intervene; transparency reduces misunderstandings.

4.8 Cross-Links

- Survival Priorities → Rule of 3s (prioritize life threats and thermal protection): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before consequential choices): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate decisions as conditions change): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (contact trees, rendezvous, alternates): ../front-matter/03-survival-priorities.html#pace-communications-plan

4.9 Scenario

Scenario (Storm, locked lobby): A glass-walled office tower is the only dry place in a hailstorm. A person is bleeding outside. Decisions: Break in vs shelter under overhang; call security or 911; consent to treat? Outcome: You move under the overhang, call 911 and building security, control bleeding with pressure, and avoid illegal entry. Lessons: - Render aid within training and consent - Prefer legal, safe alternatives; involve authorities Drill: Write your "why I didn't break in" note to yourself now, so it's easy later.

Part II

Part II — Orientation, Time & Navigation

Chapter 5

Timekeeping Without a Clock

5.1 Overview

When electronics fail or you conserve battery, you still need rough timing for safety: knowing when to turn back, when the sun will set, and how long tasks will take. Use the sky, your steps, and simple improvised timers to keep your plan on schedule.

5.2 Sun Shadow Stick

Use the sun's predictable motion to measure time and direction.

Setup (flat ground): - Place a straight stick (0.5–1 m) upright in the ground. - Mark the tip of the shadow with a small stone (Mark A). Wait 15–30 minutes. - Mark the new tip location (Mark B). Draw a line from A to B—this line points roughly west (A) to east (B) in the northern hemisphere; reverse in the southern hemisphere.

Estimating time: - The sun moves ~15° per hour across the sky. The shadow tip moves steadily. After calibrating once (see below), you can estimate minutes passed by the shadow's progress between marks.

Calibration: On a day when you know the time, mark the tip every 10 minutes for 1 hour and label the marks. Re-use that spacing as a mental model later.

Note: Near the equator and around solar noon, shadow movement slows or shortens; expect less precision.

5.3 Sun Arc Heuristics

Crude but quick estimates by sun position.

- "Fist rule": At arm's length, the vertical width of your fist 10–15° ~40–60 minutes of sky travel. Count fist-widths between sun and horizon to estimate time until sunset.
- Seasonal caveat: High latitudes and seasons (summer/winter) change sun height; be conservative.

Tip: Combine with a set turnaround time (e.g., "Two fists to sunset → stop forward progress now and set shelter").

5.4 Star "Clock" Basics

Use the rotation of a star pattern around the celestial pole to estimate hours at night.

Northern hemisphere (Big Dipper/Polaris): - Find the Big Dipper. Draw a line through the two outer bowl stars to Polaris (North Star). Imagine a clock with Polaris at the center and the Dipper as the hour hand. - The Dipper rotates counter-clockwise ~360° per 23h56m (~15°/h). If the Dipper is "on the horizon" at the 9 o'clock position and later "above" at 12 o'clock, roughly 3 hours passed.

Southern hemisphere (Crux/Southern Cross): - Extend the long axis of Crux ~4.5 times to find the south celestial pole (SCP). Use the rotation of the Cross around the SCP as your "hour hand." It rotates clockwise ~15°/h.

Caution: Cloud, light pollution, and seasonal star positions reduce accuracy. Treat as coarse estimates (±1–2 h).

5.5 Moon Phase Hints

The moon's rise/set times shift with phase. Useful for rough planning.

- New moon: Not visible; rises/sets with the sun (dark nights).
- First quarter (half-moon lit on the right in N. hemisphere): Rises around noon; sets around midnight.
- Full moon: Rises at sunset; sets at sunrise (good night light).
- Last quarter (half-moon lit on the left in N. hemisphere): Rises around midnight; sets around noon.

Note: Times vary by location and season; use these as cues, not precise clocks.

5.6 Pacing & Time-on-Task Estimates

Convert distance into time using your pace under current conditions.

Calibrate pace (flat ground): - Measure 100 m. Count steps for 100 m (each time your left foot hits is one count). Do 3 trials; average them. That's your "100 m pace." - Track distance with pace beads: 1 bead per 100 m (10 beads = 1 km). Reset each kilometer.

Time formula (rough): time (min) distance (km) ÷ speed (km/h) × 60.

Speed guidelines (on foot, with pack): - Easy trail: 3–4 km/h; broken/steep: 1–2 km/h; bushwhack/snow: 0.5–1.5 km/h.

Adjustments: - Add 10–20% for elevation gain, heat, snow, or heavy load. - Subtract 10–20% if on road/track with light load.

Checklist — Time Discipline - Set a hard turnaround time (leave 25–35% of daylight for return/setup). - Log start times at trailheads and key decision points. - Re-estimate ETA every 30–60 minutes (OODA loop) and when conditions change.

5.7 Makeshift Hourglasses & Drips

Simple timers from common items.

Water drip: - Puncture a tiny hole in a bottle cap; fill bottle; measure how long it takes to drain a known volume (e.g., 50 mL). Mark the bottle with intervals.

Sand/soil hourglass: - Two bottles/cans with a taped center hole; dry sand flows more consistently than water in freezing temps.

Gear: A small alcohol-based hand sanitizer separates wet sand; carry a paperclip/needle to make or clear holes.

5.8 Key Takeaways

- Use the sun for both direction and time; calibrate a shadow stick once to build intuition.
- At night, star rotation offers very coarse hours—combine with pacing and scheduled check-ins.
- Pace beads and conservative speed estimates prevent late shelters and night travel surprises.
- Always set a turnaround time; arriving early is free safety.

5.9 Cross-Links

- Survival Priorities → Rule of 3s (prioritize thermal/shelter vs movement): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset when rushed): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (re-estimate ETA on a loop): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (timed check-ins): ../front-matter/03-survival-priorities.html#pace-communications-plan

5.10 Scenarios

Scenario (Temperate forest): You set a shadow stick and mark two points. Two fist-widths to sunset. Decisions: Push to the overlook or set camp now? Outcome: You set a hard turnaround time and pitch before dark. You eat warm and signal on schedule. Lessons: - Timeboxing beats wishful thinking - Fist rule + turnaround saves daylight Drill: Count fist-widths to sunset three evenings in a row.

Scenario (Alpine morning): You need 90 minutes to traverse talus before storms. Decisions: Pace count vs phone timer; rest cadence. Outcome: You use beads and 30-min checks; you beat the storm line. Lessons: Pace + schedule = predictability Drill: Calibrate 100 m pace in boots.

Chapter 6

Determining Direction (No Tools)

6.1 Overview

When you lack a compass, direction still comes from the sun, stars, and terrain. Use several cues together to reduce error. If cues conflict, stop and reassess rather than forcing a bad bearing.

6.2 Sun Methods

Use shadows and the sun's daily path.

Shadow tip method (quick east–west line): - Place a stick upright; mark the tip of its shadow (Mark A). Wait 15–30 minutes; mark again (Mark B). - Draw a line A→B: in the northern hemisphere, A→B west→east; in the southern hemisphere, A→B east→west. Perpendicular to this line gives north–south.

Morning/evening heuristic: - Morning: Sun is roughly in the east; shadows point roughly west. Evening: reverse.

Caution: High latitudes and daylight savings of intuition make these rough. Verify with at least one other cue.

6.3 Polaris (Northern Hemisphere)

Find true north at night.

- Find the Big Dipper (Ursa Major). Draw a line through the two outer bowl stars ~5× their spacing to a moderately bright star: Polaris.
- Polaris sits close to true north (within ~1°). Face Polaris → you face north; east is right, west is left, south is behind you.
- Polaris altitude above the horizon your latitude (useful for rough location awareness).

6.4 Southern Cross (Southern Hemisphere)

Find true south at night.

- Locate Crux (Southern Cross). Extend the long axis of the Cross ~4.5× to the south celestial pole (SCP).
- From the SCP, drop a line straight down to the horizon—that point is true south.
- Alpha and Beta Centauri ("the Pointers") can help verify the long axis orientation.

6.5 Local Cues

Terrain and ecology sometimes hint direction. Treat as supporting, not primary.

- Prevailing winds shape snow cornices and sand ripples; leeward sides show deposition.
- Tree growth: In exposed areas, trees may be stunted or flagged on the windward side.
- Aspect: In many regions, south-facing slopes (N. hemisphere) are warmer/drier; north-facing are cooler/damper (reverse in S. hemisphere).
- Urban: Street grid orientation, satellite dishes often point toward equator (south in N. hemisphere, north in S.).

6.6 Lichen Myths vs Realities

"Moss grows on the north side of trees" is unreliable.

- Moisture, shade, and local wind patterns—not cardinal direction—govern moss/lichen.
- In ravines, near water, or shaded urban areas, growth can be on all sides.

Note: Use biological cues only as a low-confidence tie-breaker alongside celestial or map cues.

Checklist — No-Tools Direction - Try for at least two independent cues (e.g., sun shadow + terrain aspect). - Draw a quick ground sketch with your east–west and north–south lines. - Mark your intended direction of travel and a backstop if you overshoot. - Re-check at set intervals or after 15–20 minutes of travel.

Examples - Mid-day, broken clouds: Build a shadow stick line, then pick a perpendicular line for north–south; choose a landmark along your bearing. - Night, southern hemisphere: Use the Southern Cross long axis to find SCP, drop to horizon for south; set a landmark and walk to it, then pick the next.

6.7 Key Takeaways

- Prefer celestial methods for cardinal directions; verify with terrain cues.
- Set visual "attack points" along your line to reduce drift over distance.
- If cues conflict, stop (STOP), rebuild the picture (OODA), and choose anew.

6.8 Cross-Links

- Survival Priorities → Rule of 3s (don't outrank shelter/thermal): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset when cues conflict): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate as visibility changes): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (timed check-ins if separated): ../front-matter/03-survival-priorities.html#pace-communications-plan

6.9 Scenarios

Scenario (Desert noon): The sun is high, shadows short. Wind carries sand from the west. Decisions: Trust wind cue vs build a shadow stick; pick a landmark. Outcome: You build a quick A→B shadow line for east–west, choose a distant butte on your bearing, and walk leg-to-leg. Lessons: Two cues beat one; pick attack points Drill: Practice shadow-line in 20 minutes.

Scenario (Southern hemisphere night): You find the Southern Cross. Decisions: Which way is south? Which landmark to pick? Outcome: Extend Crux, drop to horizon for south; you

mark a dune and travel to it deliberately. Lessons: Hemisphere-specific methods matter Drill: Sketch Crux→SCP method from memory.

Chapter 7

Map, Compass & Dead Reckoning

7.1 Overview

Navigation is a chain: orient the map, choose a line, follow it with a compass and terrain features, and keep track of distance and time. Use redundant methods—if one link breaks, the others keep you honest.

7.2 Bearings

Two common tasks: ground→map and map→ground.

Ground to map (resection) - Sight a landmark with your compass; note the magnetic bearing. - Add declination to convert to a true bearing (see Declination). Subtract 180° (back-bearing) to project from the landmark toward you. - Draw that line on the map through the landmark. Repeat with a second landmark; the intersection your position.

Map to ground - On the map, draw a line from your position to your target; read the true bearing. - Convert true→magnetic by subtracting declination (east positive; west negative). Set that bearing on your compass and follow it by sighting a distant feature; walk to it; repeat.

Back-bearing to check drift - If following a bearing, turn around and check the bearing is ±180° from your set course (mod 360°). Large differences signal drift or interference.

7.3 Declination

Magnetic north true north. Declination is the angular difference (east positive, west negative) between them at your location.

Simple conversions - Magnetic → True: True = Magnetic + Declination - True → Magnetic: Magnetic = True − Declination

Examples - Declination = +12° (east). Magnetic 70° → True 82°. True 250° → Magnetic 238°. - Declination = −8° (west). Magnetic 70° → True 62°. True 250° → Magnetic 258°.

Caution: Know whether your compass has adjustable declination. If it's set in the baseplate, don't do math twice.

7.4 Triangulation

Fix your position by intersecting lines from two (ideally three) known points.

Two-point resection (compass method) - Pick two distinct landmarks visible to you and identifiable on the map (peaks, towers). - Take magnetic bearings to each; convert to true; subtract 180° to form back-bearings. - Draw both back-bearings from the landmarks; the intersection is your position (or a small triangle—your error zone).

Three-feature resection (map method) - Align map to terrain (orient map using compass and terrain features). - Identify three features around you; draw rays toward them along your sight lines. Intersection area is your position.

7.5 Pace Count Beads

Track distance accurately without electronics.

Setup - Know your 100 m pace on flat, trail, and rough terrain (calibrate as in Timekeeping Without a Clock). - Beads: Ten lower beads (each = 100 m) and four upper beads (each = 1 km). After 10 lowers, slide one upper and reset lower beads.

Usage - Slide one lower bead each 100 m; at 1 km, reset lowers and slide one upper. - Record terrain changes and bearing checks at each kilometer in a small log.

7.6 Terrain Association

Use visible features to confirm your location constantly.

- Contours: Ridges, saddles, spurs, reentrants—match their shape and spacing to the map.
- Water: Streams, lakes, marshes—note flow direction and confluences.
- Man-made: Roads, powerlines, buildings—use as handrails or backstops.

7.7 Handrails

Follow nearby linear features that run roughly along your desired direction.

- Natural: Rivers, shorelines, ridgelines.
- Man-made: Roads, fences, pipelines.
- Offset technique: Intentionally aim to one side of a handrail (attack point) so you know which way to turn when you hit it.

7.8 Backstops

Pick an obvious feature beyond your target so you know when you've gone too far.

- Examples: A road crossing the trail, a stream bend, a cliff line.
- Set a time/distance backstop too (e.g., "If not there in 30 minutes, turn back").

7.9 Attack Points

Navigate first to an easy, nearby feature, then make a short, precise leg to the target.

- Example: Reach a stream–trail junction (attack point), then follow a 310° bearing for 400 m to a campsite.

Checklist — Simple Nav Plan - Start/known point and time logged - Target and attack point defined - Bearing(s) and declination noted (true and magnetic) - Distance (pace beads) and time estimate - Handrails/backstops identified - Contingency if off-course (stop, resection, or return to last known point)

Examples - Low-viz forest: Handrail along a stream (flowing N→S), attack point at a distinctive bend, then 600 m on 085° magnetic to a cabin. - Open terrain: Follow a fence line (handrail) 1.2 km, then use a 200 m 270° leg to a tank. Backstop is the cross-fence beyond.

7.10 Key Takeaways

- Convert bearings correctly; write both true and magnetic to avoid mental math in the field.
- Use handrails and attack points to reduce error; set backstops to prevent overshoot.
- Keep a running log of bearings, distances, and times; it's your breadcrumb trail.

7.11 Cross-Links

- Survival Priorities → Rule of 3s (don't outrank shelter/thermal): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset if lost): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (re-orient and iterate): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (timed check-ins and rendezvous): ../front-matter/03-survival-priorities.html#pace-communications-plan

7.12 Scenario

Scenario (Whiteout timberline): Trail vanishes; you can see two distinct peaks briefly through clouds. Decisions: Wander vs resection; write bearings or keep in head. Outcome: You take two magnetic bearings, convert to true, draw back-bearings, and fix position in a small triangle; you choose a handrail to a shelter. Lessons: Resection > wandering; write both true/mag Drill: Do a two-point resection at a city park.

Chapter 8

Digital Aids (as available)

8.1 Overview

Phones and handheld GPS units are outstanding—until batteries die, apps crash, or signals fail. Treat digital tools as accelerators for good fundamentals, not replacements. Preload what you need and run a battery-aware plan.

8.2 Offline Map Prep

Do this at home on Wi-Fi before travel.

- Download offline map tiles for your whole area plus alternates (city + surrounding region or trail system + exits).
- Layers: Topo, satellite, and vector road maps. Add slope/aspect/hazard layers if supported.
- Waypoints: Trailheads, shelters, water sources, bail-out routes, rendezvous spots, hospitals.
- Tracks/Routes: Pre-load your intended route and likely detours.

Note: Verify that your app shows coordinates and allows manual entry even when offline and out of service.

8.3 GPS Accuracy Caveats

Know when your dot lies to you.

- Multipath: Signals bounce off rock/steel → position jumps; expect in canyons and cities.
- Canopy: Dense trees reduce satellites in view; track drifts, speed misreports.
- Urban canyons: Tall buildings block/reflect signals; expect large errors.
- Device factors: Cold batteries, wet screens, and low sky visibility degrade accuracy.

Caution: When the track looks "too smooth" under canopy or "jittery" in a canyon, trust map + compass + terrain association first.

8.4 Battery Discipline

Stretch runtime without sacrificing safety.

- Duty cycle: Screen off; check position on a schedule (e.g., every 15–30 minutes or at decision points).
- Power settings: Airplane mode; enable only GPS; lower screen brightness; disable background app refresh.
- Cold: Keep device and power bank warm (inside jacket). Lithium loses output in cold.

- Cables: Use short, quality cables; secure against strain.

Tip: Carry a small paper map or a screenshot of the area with critical notes as a zero-battery fallback.

8.5 Waypoint Shorthand

Name things so you can parse them at a glance.

- Prefix type: TH=Trailhead, W=Water, S=Shelter, A=Attack point, B=Backstop, R=Rendezvous, H=Hospital.
- Include essentials: Name, brief note, elevation, access notes (e.g., "W-Creek clean, filter; summer only").
- Timestamp critical drops and cache notes.

8.6 Coordinate Formats

Understand and standardize what you use with your group.

- Lat/Long (WGS84):
  - Decimal degrees: 37.7749°, −122.4194° (fast typing; beware ±)
  - Degrees/minutes: 37°46.5' N, 122°25.2' W (common in marine/aviation)
- UTM: Zone + easting + northing in meters; easy for distance math on maps with grid.
- MGRS: Military grid; compact; good for voice comms once trained.

Note: Pick one default for your team; include datum (usually WGS84). Add the other formats to your quick card for translation.

8.7 Quick Conversion Cards

Make a pocket card for your kit and share a photo with your team.

- Declination value and update year for your region
- Coordinate format examples and how to switch in your app/GPS
- Pace counts for 100 m (flat/trail/rough)
- Emergency contact numbers and PACE comms plan times/channels

Checklist — Digital Nav Readiness - Offline maps + layers downloaded - Key waypoints and routes/alternates set - Declination noted; map/grid preference aligned with group - Battery plan: power bank, cable, warm carry method - Paper fallback (printed or screenshot with notes)

Examples - Weekend hike: Offline topo + satellite; TH/Water/Shelter/Rendezvous waypoints; 30-minute duty cycle; paper map in zip bag. - Urban evac drill: City vector map offline; hospitals and gas stations marked; SMS check-ins hourly; phone in low-power mode.

8.8 Key Takeaways

- Digital tools are fast and powerful, but you must plan for failure modes.
- Pre-load maps and waypoints; standardize coordinate formats within the group.
- Duty cycle location checks and protect batteries from cold; carry a paper fallback.

8.9 Cross-Links

- Survival Priorities → Rule of 3s (don't trade power for safety): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause when devices mislead): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate checks on a schedule): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (Primary/Alternate/Contingency/Emergency): ../front-matter/03-survival-priorities.html#pace-communications-plan

8.10 Scenario

Scenario (Canyon, 9% phone): The dot is jittery under cliff walls. Decisions: Trust GPS vs terrain; battery burn vs duty cycle. Outcome: You switch to airplane + GPS, check position on a 30-minute cadence, and use handrails; power bank stays warm in jacket. Lessons: Duty cycle + terrain association prevents dead-battery detours Drill: Configure offline maps and a 30-minute reminder.

Part III

Part III — Signaling & Communications

Chapter 9

Distress Fundamentals

9.1 Overview

Signaling turns a small group's senses into the world's. Your goals are to be seen, heard, or located by rescuers without creating new hazards or exhausting yourself. Use repeated, unmistakable patterns, choose high-visibility positions, and balance signaling with shelter and first aid.

9.2 SOS

Internationally recognized pattern: three short, three long, three short.

- Timing (Morse): dot = 1 unit, dash = 3 units; space between dots/dashes = 1; letters = 3; words = 7.
- Mediums: whistle, flashlight, mirror flashes, radio tones, ground panels, or knocks.

Examples - Flashlight: · · · — — — · · · then pause 10–20 seconds and repeat. - Mirror: Three quick flashes → three long sweeps → three quick flashes, repeat.

Tip: If Morse is hard under stress, default to the Rule of Three—three of anything, spaced and repeated. It's widely recognized.

9.3 Rule of Three

Use "three" as the universal distress signature.

- Three whistle blasts, repeated at intervals (e.g., every 1–2 minutes).
- Three flashes of light or mirror sweeps, repeated.
- Three fires in a line or triangle (day: smoke; night: flame glow).

Checklist — Patterning - Choose a clear pattern (three of something) and repeat on a schedule. - Leave listening windows between cycles to detect replies. - Pair different mediums (sound + light) when possible.

9.4 Whistle Signals

Carry a pea-less whistle on your person; voice carries poorly when you're tired or winded.

- Distress: 3 blasts; repeat every 1–2 minutes.
- Where are you?: 1 blast.
- Come to me: 2 blasts.
- Acknowledge/heard: 1 long blast.

Note: Agree signals with your group before departing; write them on your PACE card.

9.5 Shouting

Use your voice sparingly. A whistle is more effective and less exhausting.

- Project from high points or across water; avoid prolonged shouting in cold air (irritates throat, wastes heat).
- Pair with light signals at night and pause to listen for responses.

Tip: Cup hands to focus your voice; call out short words like "HELP" spaced by breaths.

9.6 Gunshots (Legal/Safety)

Use of firearms for signaling is dangerous and restricted in many places. Avoid unless absolutely necessary, legal, and safe.

- If used, space three shots over 1–2 minutes; ensure a safe backstop—never fire into the air; rounds come down unpredictably.
- Hearing safety: protect ears; warn companions.
- Legal: Discharge laws vary. Prefer legal alternatives (whistle, light, radio, PLB).

Caution: Fire risk in dry seasons and populated areas; do not signal with firearms where it endangers others.

9.7 Location, Positioning, and Energy Management

Pick a spot where signals will travel and rescuers are likely to search.

- Visibility: Choose open ground, ridgelines (safe from exposure), lake shores, clearings, or near handrails (roads, rivers, trails).
- Contrast: Lay out bright items (tarp/clothing) in geometric patterns; avoid visual clutter.
- Energy: Set a schedule (e.g., signal hard every 10 minutes, rest 5). Protect from cold/heat while signaling.

First Aid: Control bleeding and protect from exposure before starting extended signaling. See Survival Priorities → Rule of 3s.

Examples - Day, broken forest: Move to a small clearing near a stream bend (search handrail); lay out a bright "V" panel; three whistle blasts every 2 minutes; mirror flashes when sun breaks. - Night, urban outage: Flashlight three short/three long pattern from a balcony; text status to family on the hour; avoid blinding drivers or responders.

9.8 Key Takeaways

- Make it unmistakable: three repeated signals, on a schedule, with listening gaps.
- Prioritize safety: treat life threats and manage exposure before extended signaling.
- Choose positions that maximize detection: contrast, height, proximity to handrails.
- Prefer whistles, lights, panels, and radios/PLBs over hazardous or illegal methods.

9.9 Cross-Links

- Survival Priorities → Rule of 3s (shelter/thermal vs signaling): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before you act): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (set signal cycles, then reassess): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (who/when/how): ../front-matter/03-survival-priorities.html#pace-communications-plan

9.10 Scenario

Scenario (Temperate forest, lost): Drizzle, late day. You have a whistle and a tiny light. Decisions: Shout vs whistle; move vs signal; cadence. Outcome: You set three whistle blasts every two minutes, sweep your light in · · · ——— · · · when fog thins, and rest between cycles. Lessons: Pattern + schedule + listening windows Drill: Practice a 10-minute signal cycle with rests.

Chapter 10

Visual Signals

10.1 Overview

Visual signals scale from tiny flashes to giant ground symbols. Think contrast, size, and motion. Day favors smoke, color, and mirrors; night favors flame and light. Choose safe, open areas and prepare multiple methods.

10.2 Fires

Fire can attract attention but adds risk. Use only where safe and permitted.

- Day: Aim for smoke contrast. Dry fuel = light/whitish smoke; damp green vegetation can add volume and darker smoke—avoid plastics/rubber (toxic, illegal in many areas).
- Night: Flame triangles or lines are visible from far away; maintain safely.
- Structure: Clear a safe ring to mineral soil; keep water/dirt on hand; never leave unattended.

Caution: Wildfire risk and local bans may prohibit open flames. Choose mirrors/panels instead when conditions are risky.

10.3 Mirrors & Shiny Objects

Mirrors can project bright flashes visible miles away in sunlight.

- Sighting: Hold mirror near eye; form a "V" with two fingers as a sight; move the bright spot (reflected on your hand) onto the target.
- Sighting hole mirrors: Look through the hole; aim the bright reticle (sunspot) at your target.
- Improvised: Polished metal, foil, CD, phone screen (remove case, max brightness if using screen).

Tip: Sweep slowly across the horizon where you expect rescuers (trail, road, waterway, flight path).

10.4 Ground-to-Air Panels

Large, high-contrast letters or symbols laid on the ground.

- Materials: Bright tarps, space blankets (dull side up to avoid glare), clothing, foam pads, rocks contrasting with soil/snow.
- Scale: Each stroke 6–10 m long and 1–3 m wide; wider in open terrain. Keep area around symbols clear for contrast.

- Placement: Open areas near handrails (shorelines, ridge clearings, river bends, meadows). Avoid under canopy where aerial visibility is blocked.

10.5 Common Ground-to-Air Symbols

Use standard symbols for clarity.

10.5.1 V — Require Assistance

Lay out three long strokes to form a clear V. Angle open toward expected approach.

10.5.2 X — Require Medical Assistance

Two long strokes crossing at center. Place near the patient location.

10.5.3 → / Arrow — Direction of Travel

Long arrow with clear head; point toward your travel direction. Add a number or time beside it if possible (e.g., “14:30”).

10.5.4 Y / N — Yes / No

Respond to aircraft/ground queries if they signal questions.

10.5.5 SOS — General Distress

Three big letters; space evenly. Good on beaches, river bars, deserts, or snowfields.

10.5.6 F / W — Need Food / Water

Place near camp; keep clear surround for maximum contrast.

Checklist — Quick Panel Build - Move to open area near a handrail - Choose symbol with the fewest strokes for speed (V or X) - Lay out large, straight strokes with high contrast - Clear debris around the symbol to create a “halo” - Add arrow/time if moving

Examples - Snowfield: Tramp out a giant “V” in packed snow; add a dark jacket for contrast. - Desert wash: Lay a silver space blanket (dull side up) with rocks outlining a large “X.”

10.6 Key Takeaways

- Bigger, higher contrast, and simpler beats fancy. Aim for strokes 6–10 m.
- Mirrors are high-payoff in sun; fires require strict safety and may be illegal.
- Panels work best near search handrails and from open vantage points.

10.7 Cross-Links

- Survival Priorities → Rule of 3s (signal vs shelter): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (choose the next best signal method): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (scan skies/routes, then iterate): ../front-matter/03-survival-priorities.html#ooda

- Survival Priorities → PACE Comms Plan (who/when to signal): ../front-matter/03-survival-priorities.html#pace-communications-plan

10.8 Scenarios

Scenario (Coastal kayak, day): Ferry lane 1 km offshore. Decisions: Mirror vs smoke; shoreline V vs open beach. Outcome: You sweep mirror flashes toward the lane and tramp a giant V on the sand near a headland. Lessons: Contrast + movement near handrails = detection Drill: Practice mirror sighting at 500 m.

Scenario (Snowfield): Helicopter heard faintly. Decisions: Symbol choice; stroke length. Outcome: You stamp a huge X and stand clear; they spot you. Lessons: Big, simple, high-contrast symbols work Drill: Pace out 10 m strokes and memorize the look.

Chapter 11

Electronic Signals

11.1 Overview

Electronics extend your range and precision. Use them in an escalation ladder: low-power options first, then higher-commitment tools like satellite messengers and PLBs for emergencies. Conserve batteries and keep clear sky view.

11.2 Strobes

High-visibility, attention-getting flashes for night or low-viz.

- Modes: Steady, slow strobe, fast strobe; choose slow/medium for readability at distance.
- Placement: On your person (head/shoulder) or at a fixed, visible point; avoid blinding teammates or drivers.
- Pairings: Combine with whistle or radio call-ins on a schedule.

11.3 Chem Lights

Simple, durable, battery-free markers.

- Colors: Green (general), red (reduced night vision impact), blue/white (visibility); note that color meaning varies—brief your group.
- Duration vs brightness: 8–12 h typical; colder temps dim output. Warm with hands for better brightness.
- Uses: Mark camps/trails, identify people/gear, "buzz-saw" on string for sky circles to attract attention.

11.4 Personal Locator Beacons (PLB)

Gold standard for life-threatening emergencies with no comms.

- How they work: 406 MHz signal to satellites; registered beacon ties to your info; 121.5 MHz homing signal for local search.
- Registration: Required; keep contact info current. No subscription; battery service life ~5–7 years.
- Activation: Clear sky view; extend antenna; turn on and leave on. Stay put unless in immediate danger.
- Testing: Use built-in test mode only; do not trigger a live SOS for practice.

Caution: PLB is for imminent, life-threatening emergencies only. False activations can endanger responders and carry penalties.

11.5 Satellite Messengers

Two-way (e.g., inReach) or one-way (e.g., SPOT) devices bridge the gap between phones and PLBs.

- Presets: Pre-program "OK," "Delayed but safe," "Need pickup at X" to send quickly with minimal battery.
- Tracking: Breadcrumbs at set intervals; helpful for family and rescue routing.
- SOS: For serious emergencies; responders may message for details on two-way units.
- Sky view: Keep device with clear view; clip to shoulder strap; avoid deep canyons when possible.

11.6 Phone Emergency Features

Phones are versatile when coverage exists or for local offline tasks.

- SOS: Configure emergency SOS and emergency contacts; practice the activation gesture (varies by phone).
- Medical ID: Add allergies, meds, conditions for first responders.
- Offline: Store maps, checklists, and notes locally; use airplane mode + GPS for nav when possible.
- SMS first: Texts often get through congested networks when calls fail.

Checklist — Electronic Signal Escalation - Try low-power first: SMS, scheduled texts, and local radio call-ins - Move to higher reach: voice calls, then satellite messenger presets - Life-threatening emergency: activate PLB/SOS and stay put if safe - Keep sky view, conserve battery, and document last known location/time

Examples - Backcountry injury: No cell; send preset "Injured, non-amb, at UTM 10S 0551234 4321987, sheltering; need evac at daylight" via inReach; start 30-min strobe; conserve battery. - Coastal kayak: Weather worsening; send "Delayed but safe, landing at ALT beach" preset; activate white strobe on PFD; hold VHF watch if licensed and applicable.

11.7 Key Takeaways

- Escalate signaling deliberately: SMS → voice/radio → sat messenger → PLB for life threats.
- Keep devices warm and with sky view; duty-cycle checks; carry paper backups.
- Pre-program presets and contacts so signaling under stress is one-button simple.

11.8 Cross-Links

- Survival Priorities → Rule of 3s (battery vs shelter/thermal): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause before SOS, verify need): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate on a schedule, update intent): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (primary/alternate paths): ../front-matter/03-survival-priorities.html#pace-communications-plan

11.9 Scenario

Scenario (Backcountry injury): No cell, two bars sometimes on a ridge, inReach on shoulder. Decisions: Preset vs custom; move for sky view vs stay. Outcome: You send a preset with precise coords and intent to shelter; you keep the device with sky view and duty-cycle checks. Lessons: Presets + sky view + patience Drill: Program three useful presets today.

Chapter 12

Radios (Brief, Practical)

12.1 Overview

Radios connect teams when phones fail. Keep it simple: pick legal services for your region, standardize channels and tones, and practice concise, clear exchanges. Height beats power; line-of-sight matters.

12.2 FRS/GMRS Basics

Know your service and its limits (U.S. examples—verify your country's rules).

- FRS (Family Radio Service): No license; fixed antennas; low power (0.5–2 W depending on channel); typical range 0.5–2 mi on foot.
- GMRS (General Mobile Radio Service): License required in U.S.; higher power (up to 50 W mobile); detachable antennas; can use repeaters.
- "Privacy codes": CTCSS/DCS sub-audible tones reduce nuisance traffic but do not secure your comms.

Range reality - Open ridge to ridge: many miles. Forest/urban clutter: hundreds of meters to a few km. Inside buildings: highly variable.

12.3 Line-of-Sight

Radios are mostly line-of-sight at these frequencies.

- Gain height: Move uphill, hold radios upright; avoid standing behind vehicles/rock walls.
- Obstructions: Buildings, terrain, and wet foliage absorb/reflect signals.
- Human body: Don't block the antenna with your hand; keep it vertical.

12.4 Simple Antennas

For services that allow it, antennas yield the biggest improvement per dollar.

- Handhelds: A 1/2-wave whip often outperforms short "rubber ducks."
- Mobiles: Roof-mounted quarter-wave whips with good ground plane.
- Position: Get the antenna above head height; extend fully; keep vertical.

12.5 Channel Discipline

Be brief, clear, and predictable.

- Call format: “You–This is–Me–On–Channel” (e.g., “Base, this is HikerOne on three.”)
- Keep it short: Who/Where/What/Intent. Avoid chatter.
- Prowords: “Say again” (repeat), “Standby” (wait), “Affirmative/Negative,” “Wilco” (will comply), “Break” (separate thoughts), “Out” (end).
- Phonetics: Use NATO phonetic alphabet; numbers spoken individually when clarity matters.
- Check-ins: On the hour and half-hour or by plan; acknowledge with status.

12.6 PACE Comms Plan

Write it down and carry it.

- Primary: e.g., GMRS Ch 3, tone 0.
- Alternate: FRS Ch 1, tone 0.
- Contingency: Text on the hour; leave written note at trail junction.
- Emergency: Meet at “North Lot 19:00”; PLB/SOS for life threats only.

Checklist — Radio Op Quickstart - Radio on correct channel/tone; volume set - Antenna vertical; move to high, clear spot - Press-to-talk: press, pause 1 second, speak; release fully - Use WHO/WHERE/WHAT/INTENT; confirm with readback - Log key messages (time, content, decisions)

Examples - Search rendezvous: “Base, HikerOne: At Saddle Junction 14:10, all okay, intent continue south to Creek, next check-in 15:00, over.” - Urban family check: “FamilyNet, Alex: Home 18:20, power out, intent stay, next 20:00, out.”

Legal: Licensing and permitted power/antennas vary by country and service. Follow local regulations. Do not transmit on emergency or restricted channels unless directed or in true emergency per law.

12.7 Key Takeaways

- Height and antenna quality often matter more than raw power.
- Standardize channels, tones, and message format; schedule check-ins.
- Keep transmissions short and clear; confirm with readbacks.

12.8 Cross-Links

- Survival Priorities → Rule of 3s (safety and shelter before comms marathons): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before cluttered radio traffic): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate check-ins and decisions): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (this entire section operationalizes it): ../front-matter/03-survival-priorities.html#pace-communications-plan

12.9 Scenario

Scenario (Neighborhood after storm): Power out, cell congested. Family and two neighbors check in on FRS Ch 2. Decisions: Check-in cadence; message format; who logs. Outcome: You run top-of-hour check-ins with WHO/WHERE/WHEN/WHAT/INTENT; readbacks confirm; you log decisions. Lessons: Cadence + format + readbacks = clarity Drill: Do a 10-minute radio net with prowords at home.

Part IV

Part IV — Shelter, Fire & Thermal Management

Chapter 13

Site Selection & Microclimates

13.1 Overview

Where you stop often matters more than what you carry. Good sites keep you dry, block wind, reduce radiant heat loss or gain, and avoid overhead and ground hazards. In towns, "safe rooms" protect from glass and debris while preserving breathable air.

13.2 Drainage

Keep water moving past you, not through you.

- Avoid low spots, gullies, dry streambeds (arroyos), and depressions that become ponds in rain.
- Prefer slight rises or benches with a gentle slope (1–3°) so water sheds away.
- In storms, camp 60–70 m (200–230 ft) above rivers/creeks and away from floodplains.
- In snow, pack the surface flat to prevent body heat from melting you into a cold trough.

Tip: After a short rain, look for where needles and leaves accumulate—nature's "flow map."

13.3 Deadfall

Scan up before you commit.

- Widowmakers: Dead limbs/tops hung in trees; avoid camping within 1.5× the height of suspect trees.
- Leaners: Wind-loaded or root-compromised trees, especially after saturated soils or burn scars.
- Snow/ice load: Under thawing branches or eaves; thaw cycles drop ice unexpectedly.

Caution: Wind shifts at night. Sites safe at calm dusk can become dangerous by midnight.

13.4 Wind Breaks

Block wind without moving into a venturi or rotor.

- Use terrain: Leeward side of knolls, behind rock outcrops, or in sparse trees (not directly under dead limbs).
- Set back from ridge crests by ~10–30 m on the lee side; avoid saddles where wind accelerates.
- In sand/snow, build low walls; leave a gap for controlled airflow to reduce condensation.

Note: Cold air pools in valley bottoms and hollows. Even a 10–30 m rise can be markedly warmer on still nights.

13.5 Radiant Hazards

Manage heat gain/loss from nearby surfaces.

- Wilderness: Big rock faces radiate heat after sunny days (can be helpful) but also radiate cold to clear night skies (frost pockets). Don't bed directly against heat sinks.
- Urban: South-facing masonry/glass (N. hemisphere) can superheat rooms by day; metal and concrete radiate heat at night. Choose interior walls and insulated floors if possible.

13.6 Urban Safe Rooms

Pick spaces that protect from glass, debris, and exterior hazards.

- Tornado/high wind: Small interior rooms on lowest floor, away from windows; sturdy furniture to shelter under.
- Earthquake: After shaking stops, avoid exterior walls and glass curtain facades; be cautious of stairwells until inspected.
- Air quality/hazmat: Choose a room with few vents; seal gaps with tape/towels; run only safe air filtration.
- Fire/smoke: Prioritize egress paths; keep doors closed to control smoke; stay low.

Legal: Know building policies for access and alarms; do not block exits.

13.7 Standoff Distances (Rules of Thumb)

- Watercourses: 60–70 m (200–230 ft) setback to reduce flood risk and contamination.
- Cliffs/cornices: Stay back at least body length + pack from edges; more in snow/corniced ridges.
- Trees: Avoid within 1.5× tree height of dead/dying trees in wind.
- Avalanche slopes/runouts: Avoid obvious avalanche paths, loaded lee slopes, and runout zones.

Checklist — Site Quick Scan - Ground drains away from sleeping area - Overhead clear of dead limbs/ice/glass - Wind break present without venturi - Away from flood/slide/rockfall/avalanche paths - Thermal: not in cold sink; has ground insulation - Urban: interior room, sealable, two egress options if possible

Examples - Shoulder-season storm: Bench 20 m above creek, lee of low ridge, no overhead hazards; pitch low A-frame, dig shallow trench to shed runoff. - Hot urban blackout: Interior hallway room with door; block light leaks, open window only on the shaded side at night, create cross-breeze with a fan if power exists.

13.8 Common Mistakes

- Camping in low spots, dry creek beds, or floodplains—good views, bad drainage.
- Ignoring overhead hazards (dead limbs, ice, glass façades); wind shifts at night.
- Perching on windward ridges or saddles that accelerate wind; step to the lee shoulder instead.
- Sleeping in cold sinks when a short climb gains warmer air.
- Sitting too close to water for convenience; spray, condensation, and flood risk soak gear.
- Urban: Choosing glass-heavy rooms for "light" instead of interior safe rooms.

13.9 Key Takeaways

- Dry, wind-sheltered, hazard-free ground beats most gear shortcomings.
- Think in three layers: drainage (ground), wind (air), radiation (surfaces/sky).
- In towns, pick interior rooms away from glass; in wild, pick benches away from lows/highs.

13.10 Cross-Links

- Survival Priorities → Rule of 3s (thermal outranks water/food): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before choosing a site): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (update plan as weather shifts): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (share location and timing): ../front-matter/03-survival-priorities.html#pace-communications-plan

13.11 Scenarios

Scenario (Temperate storm): Two benches—one near creek, one lee of a low ridge. Decisions: Drainage vs wind vs overhead hazards. Outcome: You pick the lee bench, stake low, trench lightly where allowed, and stay dry. Lessons: Drainage + wind break beats "pretty view" Drill: Walk a park after rain and map water flow.

Scenario (Urban smoke): AQI spikes; ash falling. Decisions: SIP room vs leave; sealing; ventilation. Outcome: You choose an interior room, seal, run HEPA, and monitor alerts. Lessons: Interior, sealable rooms win smoke days Drill: Stage tape/towels in your chosen room.

Chapter 14

Emergency Shelter Types

14.1 Overview

Shelter buys you time by slowing heat loss or gain. Prioritize ground insulation, wind control, and moisture management before fancy roofs. Build fast, small, and strong; add comfort later. Ventilate to control condensation and avoid CO risk.

14.2 Debris Hut

Insulated, low profile, good for cold still nights with minimal kit.

- Materials: Ridgepole (body length + 30–60 cm), two sturdy supports (Y-sticks or tree), ribs (arm-thick), heaps of dry leaves/duff/grass.
- Steps: Build a low A-frame entrance just wider than shoulders; lay ribs down to ground; pile 30–60 cm of dry debris (more in cold/wet); add a thin weather layer (bark, evergreen boughs) if available.
- Floor: Thickest insulation under you (duff, boughs, pad if you have it).
- Size: Just big enough to crawl in and turn—smaller warms faster.
- Door: Plug with a debris bundle after you enter; leave a fist-size vent.

Caution: Never use live branches from protected species; follow Leave No Trace and local regulations.

14.3 A-Frame Tarp

Fast, weatherworthy shelter for rain/wind.

- Ridgeline: Between two anchors (trees/trekking poles). Pitch low and narrow for storms; higher/wider for ventilation.
- Orientation: Narrow end toward prevailing wind; leave lee side slightly lower.
- Edges: Stake taut; add mid-panel guylines for strength; dig a small drip trench only where permitted.
- Ground: Use a groundsheet; slope away; add a pad and extra insulation.

Tip: Add a short beak/porch by offsetting one corner or using a second small sheet.

14.4 Lean-To

Useful when you have a heat source or need an open face for visibility.

- Structure: Upright supports and a slightly angled roof sloping away from wind.
- Wind: Put back to wind; use natural windbreaks; add side walls from brush or extra tarp edges.

- Heat: With a safe, controlled fire and a reflective wall (rocks/foil blanket) in front, radiant heat reflects into the shelter.

First Aid: Avoid smoke inhalation; coughing and headache can indicate poor ventilation or CO exposure.

14.5 Snow Trench / Quinzhee

Snow shelters insulate well if built and ventilated correctly.

- Snow trench: Dig a narrow trench just longer than you; roof with skis/branches and a tarp/snow blocks; cover with 30–60 cm of snow. Add a small vent hole.
- Quinzhee (snow mound): Pile snow into a dome; let sinter 60–90 minutes; tunnel in and hollow to 30–40 cm wall thickness (check with sticks). Cut a vent; raise a sleeping platform above floor to trap cold air.
- Entrances: Small, low entrance on leeward side; create a cold-air sump near the door.

Caution: Collapse risk. Probe roof regularly; never build where roof failure buries you in hazard (tree wells, over streams). Keep a shovel inside.

14.6 Vehicle Sheltering

Vehicles are solid wind/rain shelters with major caveats.

- Ventilation: Crack windows on the lee side; avoid running engine for heat due to CO risk. If you must run it, do so intermittently with tailpipe completely clear of snow/debris and CO detector if available.
- Heat retention: Insulate windows with reflectix/foam/clothing; block convective drafts; use sleeping bags/pads on seats or floor.
- Signals: Place reflective triangle/lights; conserve battery; avoid draining to 0%.

Caution: Never sleep with engine running. Check tailpipe frequently in snow.

14.7 Urban Shelter Strategies

Staying put safely in buildings.

- Stairwells: Often reinforced; good temporary refuge in quakes and fires (unless smoke-filled). Don't block egress.
- Interior rooms: Use rooms without exterior glass for wind/hail/tornado; add soft protection (mattress/helmets) from debris.
- Sealing doors/windows: For smoke or dust, seal gaps with wet towels/tape; for heat, hang reflective barriers on sun-facing windows.

Checklist — Shelter Priorities - Ground insulation under you - Roof/tarp pitched to shed wind/rain toward lee - Ventilation gap present (reduce condensation/CO risk) - Site drains; no overhead hazards - Signal plan visible from shelter (mirror/light/panel)

Examples - Cold rain, minimal gear: Low A-frame with all edges tight; thick bed of duff; hot drink; set whistle/flash schedule. - Deep snow: Snow trench with tarp roof; vent hole; raised bed; candle for minimal warmth (monitored, ventilated).

14.8 Narrative — Emergency Tarp Night

The forecast lied. Wind veered, rain thickened, and the first pitch flapped like a flag. You dropped the ridgeline a forearm and slid the windward stakes a handspan toward the ground until the tarp became a low, tight wedge. One corner flipped forward as a beak; the lee edge came down just enough to keep a palm-wide

gap for airflow. A trash bag under your pad stopped ground-chill; your spare clothes stuffed into a pillowcase became a door plug. The world shrank to a dry, warm triangle—quiet enough to sleep.

14.9 Common Mistakes

- Pitching too high and wide in storms; flappy tarps leak heat and water.
- Ignoring ground insulation; cold ground robs heat faster than thin roofs save it.
- Setting up in drainages or depressions; sites become streams at 02:00.
- Zero ventilation; condensation soaks gear—leave a small gap or vent.
- Burning stoves/fires in enclosed spaces; CO risk is real even with small flames.
- Cutting live branches or damaging protected areas; violates rules and ethics.
- Skipping the overhead scan; widowmakers and ice fall at night.

14.10 Key Takeaways

- Insulate the ground first; a warm back beats a fancy roof.
- Pitch small and low in storms; add ventilation to control condensation.
- Vehicles and buildings can be excellent shelters if you manage ventilation and CO risk.

14.11 Cross-Links

- Survival Priorities → Rule of 3s (thermal outranks water/food): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset before committing to a build): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate as weather and energy change): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (signal schedule from shelter): ../front-matter/03-survival-priorities.html#pace-communications-plan

14.12 Scenarios

Scenario (Squall line): Wind shifts and rain hits hard. Decisions: Low A-frame vs lean-to; beak or not; vent gap. Outcome: You pitch a low A-frame, beak one end, keep a small vent, and sleep dry. Lessons: Small/low/vented beats flappy palaces Drill: Time yourself pitching low in 3 minutes.

Scenario (Deep snow, calm): Decisions: Trench vs quinzhee; venting; platform. Outcome: You dig a trench with a tarp roof and a raised sleeping shelf; vent hole open. Lessons: Cold-air sump + raised bed = warmest sleep Drill: Build a mock trench without snow using gear layout.

Chapter 15

Firecraft

15.1 Overview

Fire provides heat, light, morale, drying power, signaling, and disinfection—but it also consumes time and fuel, and can create serious hazards. Choose fire only when it materially improves safety or mission. Obey local restrictions and practice Leave No Trace.

15.2 Fire Triangle

All fires need fuel, heat, and oxygen. Balance these for reliable starts.

- Fuel: Tinder (catches spark), kindling (pencil to thumb size), fuelwood (wrist to forearm size). Dryness matters more than species.
- Heat: Sparks, flame, or ember—protected from wind and rain; maintain heat by adding fuel gradually.
- Oxygen: Don't smother the core; structure stacks to allow airflow.

15.3 Ignition Sources

15.3.1 Ferro Rod

Shower of hot sparks; works wet; nearly endless strikes.

- Scrape spine of a sharp knife/scraper down the rod; lock scraper, move rod for control.
- Tinder: Fine, dry fibers—cotton with petroleum jelly, birch bark curls, fatwood dust, scraped inner bark.
- Build a small tinder bundle with a shallow "nest"; shower sparks into the nest; add pencil-lead kindling as soon as it flames.

15.3.2 Lighter

Fastest reliable flame; protect from wind/wet.

- Shield with your body; create a small windbreak; pre-split kindling so flame contacts edges.
- Carry two lighters in separate places; tape one's fuel button to prevent discharge.

15.3.3 Battery + Steel Wool (Safety)

For emergencies when other methods fail.

- Use fine steel wool (0000). Stretch to increase resistance; touch both battery terminals (9V easiest) to fibers until they glow; blow gently and transfer to tinder bundle.
- Precautions: Fire hazard; don't pocket used wool; avoid near gas vapors; don't short lithium cells.

15.4 Fire Lays

15.4.1 Teepee

Kindling leaned in a cone around tinder; great for fast ignition and signaling flame; fragile in wind and wet.

15.4.2 Log Cabin

Square stack around teepee core; stable, good airflow, easy to feed; nice for cooking coals.

15.4.3 Long Fire

Two parallel logs with space between; excellent radiant heat for sleeping next to or boiling long pots; feed from ends.

Tip: In wet conditions, split logs expose dry inner wood; baton safely to create dry kindling.

15.5 Wet-Weather Starts

Pre-plan for wet. Seek dry from the inside out.

- Fuel sources: Dead standing wood, inner heartwood, fatwood (resin-rich), birch bark (oily), conifer cones.
- Feather sticks: Carve thin curls into split sticks to increase surface area; keep attached; ignite curls first.
- Platform: Build on a dry base (bark/green sticks) to keep tinder off wet ground or snow.
- Canopy: Pitch a tarp/poncho partial roof while you work.

15.6 Ember Tending

Once you have coals, guard them—they're your banked heat.

- Feed steadily with similar-size pieces to avoid smothering.
- Create a coal bed for cooking; rake coals for even heat.
- If leaving temporarily, cover with ashes to slow burn; revive with airflow and small fuel.

15.7 Safety

15.7.1 Carbon Monoxide Risks

Never burn stoves or fires inside enclosed, unventilated shelters or vehicles. Use a CO detector when possible; keep ventilation.

15.7.2 Clearances

Clear a wide area to mineral soil; remove duff; build a small ring if appropriate; keep spark arrestors on stoves.

15.7.3 Extinguishing

Cold-out standard: Drown, stir, drown again. Feel for heat with the back of your hand. If it's too hot to touch, it's too hot to leave.

15.7.4 Leave No Trace

Prefer existing fire rings; keep fires small; burn only small dead/down wood; scatter cold ashes; restore site to natural appearance.

Legal: Obey fire bans and local regulations; penalties can be severe and fires destructive.

Checklist — Fast, Safe Fire - Need confirmed (heat/dry/signal)? If not, skip the fire - Site safe: clear to mineral soil; wind manageable; water/dirt on hand - Tinder ready, then pencil-lead kindling, then pencil-thick, then thumb-thick - Ignition source tested and backup present - Plan to cook/heat? Choose lay accordingly (cabin/long fire) - Cold-out plan: drown, stir, hand-check before leaving/sleeping

Examples - Cold/wet afternoon: Split dead standing wood; feather sticks under tarp edge; ferro rod to cotton/vaseline; build small log cabin; boil water; cold-out before sleep. - High fire danger: No open flame; use stove in designated area with clear mineral soil; or skip heat, focus on layers, shelter, hot drinks from insulated bottle.

15.8 Common Mistakes

- Building big before building hot; smothering tinder with heavy fuel.
- Gathering wet ground wood instead of splitting to dry inner wood.
- Lighting under low branches or near duff in wind; poor clearances start spot fires.
- Ignoring fire bans or leaving half-out fires; burying coals instead of cold-out.
- Running stoves or open flames in enclosed shelters or vehicles; CO hazards.
- On snow: No platform—fire sinks and drowns; build a base of green sticks/bark.

15.9 Key Takeaways

- Fire is a tool, not a goal—use it when it improves safety, warmth, or signaling.
- Structure airflow and dry inner wood; build small and controlled, especially in wind/wet.
- Extinguish to true cold-out; follow laws and Leave No Trace.

15.10 Cross-Links

- Survival Priorities → Rule of 3s (choose thermal strategies): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (decide if fire is worth the time/fuel): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (monitor wind/fuel; adapt lay): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (set signal schedules if using fire for signaling): ../front-matter/03-survival-priorities.html#pace-communications-plan

15.11 Scenarios

Scenario (Wet forest): Kindling soaked; morale low. Decisions: Burn time on a fire vs layers; tinder choice. Outcome: You split to dry cores, carve feather sticks, light cotton/vaseline with

a ferro rod, and build a small log cabin; hot drink restores morale. Lessons: Dry inner wood + structure + patience Drill: Start a fire in rain under a tarp edge.

Scenario (High fire danger): Decisions: Fire vs stove vs no flame. Outcome: You skip open flame, use a stove on mineral soil, and rely on insulation. Lessons: "No fire" is often the safest choice Drill: Pack a "hot drink without fire" kit.

Part V

Part V — Water & Food

Chapter 16

Water Sourcing & Risk

16.1 Overview

You can't operate without water, but unsafe water can incapacitate you. Choose sources with the lowest contamination risk, approach them safely, and assume treatment is required unless you personally control the source. Pair source selection with proper purification from the next chapter.

16.2 Moving vs Stagnant Water

Prefer cold, clear, fast-moving water emerging from the ground over warm, stagnant pools.

- Best: Springs and seep lines near their origin; snowmelt runoffs above human/animal activity.
- Better: Mid-stream flow away from banks; avoid eddies and after recent floods.
- Avoid: Stagnant ponds, beaver ponds (giardia risk), stock tanks, or water with visible scum/odor.

Note: Clarity safety. Microbes and chemicals can be invisible. Always treat.

16.3 Surface Clues

Read the water and its surroundings before committing.

- Color/odor: Tea-colored from tannins can be okay; milky/opaque after storms = heavy sediment; chemical or sewage odor = hard no.
- Algae: Avoid bright green/blue-green scums or paint-like sheens (cyanobacteria toxins are not removed by boiling or most filters).
- Animal sign: Tracks and droppings indicate upstream activity—raise treatment rigor.
- Upstream check: Walk upstream if time allows; avoid sources downstream of mining, agriculture, industry, or campsites.

16.4 Urban Sources

Household and building systems can provide emergency water with care.

- Water heater tank: 120–300 L typical. Close the main valve first to avoid draining/contamination, then use the drain spigot at the base. Water may be hot—cool before drinking and still treat.
- Toilet tank (cistern, not the bowl): Can be clean if no additives (dye/cleaners). Treat before use.
- Plumbing: Open highest faucet to admit air; drain from lowest faucet. Sediment may flush initially.
- Cisterns/rain barrels: Treat as surface water; elevated organic load demands careful filtration/chemical treatment.

Caution: Post-flood urban water can contain fuel, oil, sewage, or chemicals. Filters may not remove dissolved chemicals or heavy metals. Choose sealed bottled sources when possible.

16.5 Approach & Collection Safety

- Footing: Wet rocks/logs are slick; use three points of contact; don't lean into fast water.
- Swiftwater: Avoid edges of fast, opaque flows; use poles to probe depth; do not enter moving water above knee depth.
- Intake: Collect mid-column away from banks; avoid disturbing sediments; pre-filter with cloth to reduce turbidity before treatment.

16.6 Distance From Water (Sanitation)

- Camp and toilet at least 60–70 m (200–230 ft) from water to prevent contamination and reduce flood risk.
- Wash and dispose of dish/soap water away from sources; scatter strainings; use biodegradable soap sparingly.

Checklist — Source Selection - Clearer, colder, moving water favored over warm/stagnant - No chemical odor or suspicious sheen/scum - Upstream free of obvious ag/industrial/human contamination - Safe approach and footing; avoid fast/opaque edges - Collect mid-stream/mid-column; pre-filter if turbid

Examples - Forest ridge: Spring seep with cool, clear flow—collect above animal trails; filter + chemical. - Desert wash: Cloudy pools after storm—wait to settle, pre-filter, then filter + chlorine dioxide; consider alternate route to known water cache. - Urban high-rise: Shut main, drain water heater via spigot; cool and treat; use bottled/packaged water first if available.

16.7 Key Takeaways

- Choose the cleanest source you can reach safely; assume all natural and building sources require treatment.
- Avoid cyanobacteria blooms and any chemical odors—move on if in doubt.
- Maintain sanitation distances from water to protect the source and yourself.

16.8 Cross-Links

- Survival Priorities → Rule of 3s (water vs shelter timing): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (don't rush into unsafe water): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (reassess source and treatment as conditions change): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (check-ins before/after water runs): ../front-matter/03-survival-priorities.html#pace-communications-plan

16.9 Scenarios

Scenario (Temperate creek post-storm): Water runs brown. Decisions: Scoop now vs wait to settle vs walk upstream. Outcome: You walk upstream away from camp runoff, collect mid-stream, and pre-filter cloth before treatment. Lessons: Upstream check + pre-filter beats muddy filters Drill: Practice mid-column collection without stirring sediment.

Scenario (Urban high-rise): Mains off, you need water. Decisions: Heater tank vs toilet tank; close main first? Outcome: You close the main, drain the water heater, cool and treat. Lessons: Building systems = emergency reservoirs Drill: Locate your heater drain and the main shutoff.

Chapter 17

Purification

17.1 Overview

Use a multi-barrier approach: pre-filter to remove sediment, then disinfect by boiling, chemicals, UV, or filtering to an appropriate pore size. No single method is perfect for all threats; choose based on source and context.

17.2 Boiling

Robust and widely effective for microbes.

- Bring water to a rolling boil for at least 1 minute. At elevations above 2,000 m / 6,500 ft, boil for 3 minutes.
- Let cool naturally; protect from re-contamination (pour into clean, covered container).
- Fuel cost: High. Plan fuel budget; boil larger batches to save time.

Note: Boiling inactivates bacteria, viruses, and protozoa (including Giardia and Cryptosporidium) but does not remove chemicals/heavy metals.

17.3 Chemical Disinfection

Fast, light, and works well on clear water. Less effective in very cold or turbid water; extend contact time.

Unscented household bleach (sodium hypochlorite) - Strength varies. Common: 6% or 8.25%. - Clear water: 2 drops/L (about 8 drops/gal) for 6%; 1–2 drops/L (6 drops/gal) for 8.25%. - Cloudy water: Double the dose. Mix well; wait 30 minutes; a slight chlorine smell should be present. If not, add the same dose again and wait 15 more minutes.

Chlorine dioxide tablets/drops - Effective against bacteria, viruses, and Giardia; needs up to 4 hours for Cryptosporidium (follow manufacturer directions). - Better taste than bleach; works over a wider pH range.

Iodine (tincture or tablets) - Clear water: typically 5 drops/L of 2% tincture (or per tablet instructions); 30 minutes contact; double dose/time for cold/cloudy. - Avoid in pregnancy, thyroid disease, or prolonged use; poor efficacy against Cryptosporidium.

Caution: Chemical methods require clear water. Pre-filter turbid water and extend contact times in cold conditions.

17.4 Filters

Mechanical removal of pathogens and particulates.

- Pore size: 0.1–0.2 µm hollow fiber filters remove bacteria and protozoa (Giardia/Crypto). They do not remove viruses; use a purifier (adds virus barrier) or follow with chemicals/UV when viral risk exists (crowded camps, floods).
- Carbon: Improves taste/odor; reduces some chemicals; does not "purify" alone.
- Freezing: Don't use if a hollow fiber filter has frozen; internal fibers may crack (invisible failure).
- Maintenance: Backflush as instructed; protect from biofilm growth; store dry when possible.

17.5 UV Pens

DNA/RNA disruption in clear water.

- Use only with low-turbidity water (pre-filter first). Stir per instructions to cover all sides; treat container mouth threads.
- Battery dependent; cold reduces output—keep warm in a pocket.
- Repeat the cycle for larger volumes or cold water.

17.6 Solar Disinfection (SODIS)

Passive, low-resource method for sunny conditions.

- Use clear PET bottles (2 L), fill with clear water; place on reflective surface in full sun for 6 hours (or 2 consecutive sunny days in partial cloud). Shake to oxygenate before exposure.
- Works best in equatorial/sunny climates; unreliable in high latitudes/winter.

17.7 Field-Expedient Containers

Improvise when standard containers fail.

- Rigid: Bottles/cans; remove sharp edges; boil only in metal containers.
- Flexible: Heavy freezer bags can hold treated water; double-bag for redundancy.
- Liners: Clean food-grade liners inside non-potable shells (e.g., a trash can) to transport water.

17.8 Pre-Filtering

Reduce turbidity before disinfection.

- Cloth: Bandana/coffee filter to remove large particles.
- Settle: Let water sit; decant the clearer top layer.
- Improvised sand/charcoal column: Layer cloth → sand → cloth → crushed charcoal → cloth. Run water slowly; then disinfect chemically or by boiling.

Checklist — Multi-Barrier Treatment - Source assessed; no chemical sheen/odor; cyanobacteria avoided - Pre-filter cloth/settling for turbid water - Choose method: boil (fuel), filter (pore size), chemical (time), UV (clarity) - Protect from re-contamination (clean container, lids) - Mark treated vs untreated containers clearly

Examples - Snowmelt camp: Melt and boil large batch; store in covered, clean bottles; avoid eating snow directly. - Murky desert pool: Settle overnight, decant, filter (0.1 µm), add chlorine dioxide; wait full Crypto time. - Post-flood urban: Prefer bottled/packaged water. If none, filter + activated carbon + chlorine; avoid water with chemical odors.

Narrative — The Boil-Only Kitchen The power was out, and the faucet sputtered. You found a stockpot, two clean jars with lids, and half a fuel canister. Rather than chase cups at a time, you settled silt from a bucket, poured the clear top into the pot, and brought it to a rolling boil—three minutes, because of the mountain sticker on the fridge. One jar got a strip of blue tape—"TREATED"—and the other "RAW." The rule was simple: raw water only touches the big pot and the "RAW" jar; hands and cups touch the blue-taped jar. Fuel stayed enough for breakfast because you boiled once, not five times.

17.9 Common Mistakes

- Cross-contamination: Using the same lid/container for raw and treated water.
- Under-treating Crypto: Not waiting the full time for chlorine dioxide in cold water.
- Relying on filters after they've frozen; hollow fibers may be cracked.
- Assuming filters remove chemicals/heavy metals; they don't without specific media.
- Skipping rolling boil or elevation adjustment; short boils risk survival of pathogens.
- Using iodine in pregnancy/thyroid disease or for prolonged periods.

17.10 Key Takeaways

- Combine steps: pre-filter + disinfect. Match the method to the threat profile.
- Boiling is broadly effective but fuel-intensive; filters don't remove viruses; chemicals need clear water and time.
- Prevent re-contamination by separating clean/dirty gear and labeling containers.

17.11 Cross-Links

- Survival Priorities → Rule of 3s (water urgency vs thermal): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (slow down and choose the right method): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (re-assess after pre-filtering and testing taste/odor): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (check-ins during long treatment times): ../front-matter/03-survival-priorities.html#pace-communications-plan

17.12 Scenario

Scenario (Desert pool, murky): Sun drops in 90 minutes. Decisions: Boil muddy water vs settle/filter/chemical. Outcome: You settle, decant, cloth pre-filter, filter 0.1 µm, then chlorine dioxide for Crypto overnight; you sip your reserve with salt while waiting. Lessons: Multi-barrier tailored to turbidity Drill: Time how much clearer water gets after 30 minutes of settling.

Chapter 18

Hydration & Dehydration

18.1 Overview

Dehydration quietly erodes judgment, strength, and thermoregulation. Plan intake, watch for early signs, and treat with measured fluids and electrolytes. Balance against the risks of hyponatremia (too much plain water) and heat illness.

18.2 Signs and Stages

Recognize progression early to prevent spirals.

- Mild (1–2% body weight loss): Thirst, dry mouth, darker urine, mild headache, decreased focus, irritability.
- Moderate (3–6%): Dizziness, fatigue, rapid pulse, reduced sweat/urine, cramps, poor decisions, nausea.
- Severe (7%): Very dark/no urine, confusion, fainting, cold clammy skin or hot dry skin, rapid breathing, shock—medical emergency.

Note: Urine color is a rough guide. Aim for pale straw. Some vitamins/foods alter color—don't rely on color alone.

18.3 Oral Rehydration

Replace fluids steadily; avoid chugging.

- Volume: As a guide, 400–800 mL per hour during exertion in heat; less in cool/calm conditions. Adjust to thirst and urine output; avoid over-drinking.
- Temperature: Cool fluids (~15–20°C / 59–68°F) are absorbed well and aid cooling in heat.
- Sips > gulps: Take frequent small drinks; add electrolytes when sweating heavily.

First Aid: If vomiting, try 5–10 mL every 2–3 minutes; escalate if unable to keep fluids or if mental status worsens.

18.4 Electrolytes

Sodium and potassium help retain water and support muscle/nerve function.

- Practical sources: Oral Rehydration Solution (ORS), broths, a mix of water + food + a pinch of salt, commercial electrolyte powders.
- Sports drinks: Often strong—consider 1:1 with water. Avoid very sugary mixes when nauseated.

- Food: Crackers, soups, nuts, and fruits complement fluids.

Caution: Hyponatremia (too much water, too little salt) mimics heat illness—headache, nausea, confusion, swelling. Favor ORS or salty snacks with water during heavy sweating.

18.5 Heat Illness Link

Hydration, rest, and cooling break the progression.

- Heat cramps → Heat exhaustion → Heat stroke.
- Heat exhaustion: Heavy sweating, weakness, nausea, dizziness, headache; pulse fast, skin cool/clammy. Move to shade, cool with water/evaporation, give ORS, rest.
- Heat stroke (emergency): Altered mental status, hot skin (may be dry or still sweating), core temp high. Call EMS. Cool aggressively: shade, douse with water, fan vigorously; ice to neck/groin/armpits.

Checklist — Daily Hydration Plan - Start hydrated (drink with breakfast) - Carry known volumes; track intake (marks on bottle) - Add electrolytes for sustained sweat or heat - Set hourly sip reminders; check urine at breaks - Adjust pace/shade/rest by conditions

18.6 ORS (Oral Rehydration Solution) Recipe

For 1 liter of safe water:

- 6 level teaspoons sugar
- 1/2 level teaspoon salt
- Mix until fully dissolved. Taste should be “not too salty.”

Notes - Use level measurements; too much salt can be dangerous, too much sugar can worsen diarrhea. - Alternatives: Commercial ORS packets; sports drink diluted 1:1 with water; broth + water + crackers if that’s all you have.

Examples - Hot trail day: Sip 500 mL/h with a light electrolyte mix; 10-minute shade rests each hour; cool hat and neck. - GI illness: Use ORS sips 5–10 mL every 2–3 minutes; escalate if lethargy, no urine 6–8 h, bloody stools, or severe dehydration signs.

18.7 Key Takeaways

- Plan hydration and electrolyte intake; avoid both dehydration and over-hydration.
- Use ORS proportions precisely; small, steady sips beat chugging when ill.
- Treat heat illness early with shade, cooling, and ORS; call for help with stroke signs.

18.8 Cross-Links

- Survival Priorities → Rule of 3s (prioritize thermal/hydration correctly): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause when symptoms start): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (adjust pace/rest/fluids as signs evolve): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (status check-ins during heat events): ../front-matter/03-survival-priorities.html#pace-communications-plan

18.9 Scenarios

Scenario (Exposed ridge, heat): No shade for 2 km; wind hot. Decisions: Pace/sip cadence; electrolyte now vs later; rest timing. Outcome: You slow pace, sip 150–200 mL every 15 minutes with light electrolytes, and take 10-minute rests each hour in micro-shade. Lessons: Cadence + electrolytes prevent spirals Drill: Mark a bottle in 100 mL increments and practice steady intake.

Scenario (GI upset): Nausea, small sips only. Decisions: ORS mixing; micro-doses vs gulps. Outcome: You mix ORS precisely and give 5–10 mL every 2–3 minutes; nausea eases and urine returns. Lessons: Tiny sips win when vomiting Drill: Measure ORS without a spoon using packet or bottle caps (note conversions).

Chapter 19

Food

19.1 Overview

Food is long-horizon. In the first 24–72 hours, safety, shelter, water, and signaling matter more. Still, smart food choices preserve energy, mood, and decision quality. Favor simple, safe, calorie-dense foods you can eat without elaborate prep.

19.2 Energy Planning

Match intake to effort and environment.

- Daily needs: Light activity 2,000–2,500 kcal; hiking with pack 3,000–4,500 kcal; cold weather adds 10–25%.
- Macro focus: Carbs for quick energy, fats for density/warmth, protein for recovery—balance helps satiety and performance.
- Meal timing: Small, steady intake beats feast/famine. Front-load before climbs or cold nights.

19.3 Rationing

Preserve energy and morale while extending supplies.

- Inventory: Count meals and snacks; set daily targets; reserve an emergency day if possible.
- Slow-burn: Nuts, nut butters, bars, jerky, oats; avoid high-GI binges that crash energy.
- No-cook options: Bars, nut mixes, tuna packets, tortillas, shelf-stable spreads; "cold-soak" oats/couscous if fuel is tight.
- Group: Pool and allocate fairly by effort and need; consider food allergies.

19.4 Safe Foraging Heuristics

Avoid GI hits that can ruin the effort. When in doubt, do not eat it.

- Identification: Only eat what you positively identify via reliable, region-specific guides or expert instruction.
- Universal edibility tests: Not reliable under field stress—avoid.
- Fungi: High risk of dangerous look-alikes—avoid unless expert.
- Season/location: Pollution, pesticides, and protected areas make many "edible" things unsafe or illegal.

Legal: Foraging laws vary by park/country; many places prohibit plant removal or trapping. Check rules and respect closures.

19.5 Fishing & Trapping (Ethics & Legality)

Focus on safety and legality.

- Observe seasons, licenses, methods, and limits; never poach.
- Safety: Water, hooks, lines, and blades create hazards; manage them deliberately.
- Humane: Quick dispatch, minimal suffering; avoid leaving gear that entangles wildlife.
- Sustainability: Take only what you'll eat; prefer abundant species.

19.6 GI Risk Avoidance

Prevent illness that drains water and energy.

- Boil risky foods thoroughly; keep hot foods hot and cold foods cold (or eat shelf-stable).
- Avoid raw/undercooked meats, unpasteurized dairy, or any food from questionable water.
- Hand hygiene: Wash or sanitize before eating/prep; clean knives/boards.
- Storage: Protect from animals/insects; use odor-control where regulations require.

Checklist — 72-Hour Food Kit (No-Cook Bias) - Dense: Nuts, nut butters, trail mix, energy bars - Protein: Jerky, tuna/salmon pouches, shelf-stable beans - Carbs: Tortillas, instant oats/couscous (cold-soakable) - Flavor/morale: Electrolyte powder, bouillon, chocolate/tea/coffee sachets - Utensils: Spoon, small knife; zip bags; sanitizer wipes

Examples - Get-home bag (24–36 h): 2,500–3,000 kcal of no-cook foods; 2× electrolyte packets/day; cold-soak oats overnight. - Storm shelter-in-place (48–72 h): Pantry cans (beans, soups, tuna), crackers, nut butters; rotate stock every 6–12 months.

Narrative — The No-Cook Menu That Worked Dinner didn't need a flame. You laid out tortillas, tuna packets, and a squeeze of mayo—one plate, no heat. Oats cold-soaked in a jar with a pinch of salt and a handful of raisins sat on the counter for morning. Mid-day was trail mix and a square of chocolate. It wasn't glamorous, but no pot needed washing and the stove fuel was still full when the lights blinked back on.

19.7 Key Takeaways

- In the short term, avoid GI risks and choose low-effort, high-return foods.
- Plan calories by activity and temperature; ration fairly; keep morale foods.
- Follow laws and ethics for any foraging/fishing; when in doubt, skip it.

19.8 Cross-Links

- Survival Priorities → Rule of 3s (food is lower priority early): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause before risky foraging): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (adjust rations vs effort/temps): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (coordinate group meals/resupply times): ../front-matter/03-survival-priorities.html#pace-communications-plan

19.9 Scenario

Scenario (No-cook 48 h): Power out; you shelter in place. Decisions: Ration plan; morale food; protein balance. Outcome: You set 3 small meals/day with nuts, bars, tuna, crackers;

add broth and a square of chocolate for morale. Lessons: Simple, dense, low-risk foods keep you sharp Drill: Build a 48-hour no-cook menu from your pantry today.

Part VI

Part VI — Medical & First Aid

Chapter 20

First Response Flow

20.1 Overview

Do the most good without becoming a casualty. Use a simple, repeatable flow: secure the scene, find and treat life-threats fast (MARCH-E), then expand care and plan evacuation. Pair this with clear communication and documentation.

20.2 Scene Safety

Scan before you touch.

- Hazards: Traffic, fire/smoke, electricity, gas, water, unstable structures, rockfall, animals, violence.
- Controls: Move yourself and bystanders to safety, don gloves/eye protection if available, turn off ignition/gas/electricity if safe, chock vehicles.
- Numbers: Count patients; call for help early if multiple.

Note: If the scene is unsafe and you cannot control it, retreat and call for help.

20.3 Primary Survey

Fast check for life-threats in this order; shout for help or assign tasks as you go.

- Responsiveness: AVPU (Alert, responds to Voice, to Pain, Unresponsive).
- Airway/Breathing: Is the airway open? Are they breathing? If not, start CPR if trained and appropriate.
- Massive bleeding: Look for and control heavy external bleeding immediately.
- Position: Place on back for assessment unless vomiting (recovery position) or trauma suggests spinal care.

20.4 MARCH-E Overview

20.4.1 Massive Bleeding

Direct pressure first. If ineffective, apply a tourniquet for limbs or pack/junctional pressure for groin/axilla/neck.

- Expose the wound; apply firm, continuous pressure with gauze or clean cloth.
- Tourniquet: Place 5–7 cm (2–3 in) above wound (not over joints). Tighten until bleeding stops; note time.

- Hemostatic gauze: Pack deep bleeding wounds tightly; hold pressure 3+ minutes.

20.4.2 Airway

Open and maintain the airway.

- Responsive: Let them find a position of comfort; avoid forcing supine if breathing worsens.
- Unresponsive, no spinal concern: Head-tilt, chin-lift; clear visible obstructions.
- Suspected spinal: Jaw thrust if trained; avoid head tilt.

20.4.3 Respiration

Assess rate, depth, symmetry; expose and look for chest wounds.

- Open chest wounds: Cover with vented chest seal if available; if none, improvise with plastic and monitor for respiratory distress.
- Support: Sit up or position of comfort if breathing is painful/difficult.

20.4.4 Circulation

Check pulse, skin color/temp/cap refill; manage shock.

- Lay flat, elevate legs if no trauma contraindication; keep warm; avoid food/drink in unstable patients.
- Reassess bleeding; treat pain appropriately if trained.

20.4.5 Hypothermia/Head Injury

Prevent heat loss even in warm weather; monitor brain status.

- Wrap in dry insulation, cover head/neck, insulate from ground (hypo kit/bivy if available).
- Head injury: Monitor AVPU, pupils, changes in behavior; avoid unnecessary movement.

20.4.6 Everything Else

Secondary head-to-toe: Look for other injuries, medical IDs, medications, allergies.

- SAMPLE: Symptoms, Allergies, Medications, Past history, Last intake, Events.
- Vitals: Level of responsiveness, pulse, respirations, skin; repeat every 5–15 minutes.

Checklist — First Response - Scene safe or controllable - Call for help early (location, number injured, hazards) - Primary survey with MARCH-E interventions - Prevent hypothermia; insulate from ground - Secondary survey and vitals; document - Evacuation plan and handoff ready

Examples - Bike crash: Massive elbow bleed—direct pressure → tourniquet; airway clear; breathing rapid but effective; wrap in jacket, lay flat; call EMS with location and number injured; monitor and document times. - Fall on trail: Unresponsive but breathing; jaw thrust to open airway; obvious femur bleed packed and held; insulate; send two to trailhead with precise coordinates while one stays and monitors.

20.5 Common Mistakes

- Skipping scene safety and entering traffic, fire, or unstable structures; becoming a second casualty.
- Treating minor wounds before life-threats; not following MARCH-E.
- Leaving patients on cold ground; rapid hypothermia worsens outcomes.
- Unnecessary movement of suspected spinal injuries without clear benefit.
- Delaying the call for help; failing to give exact location and patient count early.
- Poor documentation: No times for TQ/application or changes in status.

20.6 Key Takeaways

- Safety first; your first patient is you. Control hazards or retreat.
- Use MARCH-E to find and fix life-threats before anything else.
- Prevent hypothermia early; reassess vitals and interventions regularly.
- Communicate clearly and document times, treatments, and changes.

20.7 Cross-Links

- Survival Priorities → Rule of 3s (airway/breathing and thermal first): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset if overwhelmed): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (iterate assessment and actions): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (who calls, when, and how): ../front-matter/03-survival-priorities.html#pace-communications-plan

20.8 Scenario

Scenario (Bike crash): Rider down, bleeding, breathing fast, shivering in drizzle. Decisions: Bleeding vs airway first; hypothermia now or later; who calls. Outcome: You control bleeding with pressure/TQ, open airway, seal chest abrasion, insulate from ground, assign a caller with exact location, and monitor. Lessons: MARCH-E sequence + insulation early Drill: Say MARCH-E out loud while laying out your kit.

Chapter 21

Bleeding & Trauma

21.1 Overview

Uncontrolled bleeding is a leading preventable cause of death in trauma. Find the source fast, apply direct pressure, escalate to hemostatic packing and tourniquets when needed, then protect and reassess. Stabilize fractures to reduce further damage.

21.2 Direct Pressure

Most bleeding stops with steady, firm pressure.

- Gloves if available; expose the wound; remove large loose debris only.
- Heel of hand or stacked gauze directly on source; press hard and do not peek for 2–3 minutes.
- Add more gauze on top if soaked; do not remove the base layer (maintains clot).

21.3 Hemostatic Gauze

For deep, narrow wounds or junctional areas where tourniquets don't work.

- Indications: Deep lacerations to groin/axilla/neck; uncontrolled bleeding after direct pressure.
- Technique: Pack gauze into wound cavity with fingertip or tool, directly onto bleeding vessel; fill fully; maintain firm pressure 3+ minutes (follow product instructions).
- Dwell: Leave the packed gauze in place; cover with pressure dressing.

21.4 Tourniquets

For life-threatening extremity bleeding not controlled by pressure.

- Placement: 5–7 cm (2–3 in) above the wound (closer to the torso), not over a joint. If location uncertain or multiple wounds, place "high and tight."
- Tighten: Twist windlass until bleeding stops and distal pulse is absent; secure windlass.
- Pain is expected; do not loosen. Note time of application visibly on TQ or patient.
- Multiple TQs: If first fails, place a second above the first.

21.5 Splinting (Improvised)

Stabilize to reduce pain, bleeding, and further injury.

- Above and below: Immobilize joints above and below the suspected fracture.
- Padding: Use clothing/foam; avoid direct pressure on deformity.
- Materials: Sticks/trekking poles + cloth/tape; SAM splints if available.
- Re-check circulation/sensation/motion before and after splinting.

21.6 Sling & Swathe

Support arm/shoulder injuries.

- Sling: Triangle bandage under wrist/forearm, tied behind neck; elevate slightly.
- Swathe: Wrap torso to secure arm to chest; pad bony points.

21.7 Wound Irrigation

Clean wounds reduce infection risk.

- Volume: 500–1000 mL for small wounds; more for contaminated wounds.
- Pressure: Use a syringe or squeeze bottle; aim for brisk stream; avoid high-pressure damage to tissue.
- Remove visible dirt/grass only; do not aggressively scrub devitalized tissue in field.

21.8 Dressings

Protect and monitor.

- Layers: Non-adherent layer (if available) over wound, then absorbent pads, then wrap to secure.
- Monitoring: Check for strike-through (bleed-through) and distal circulation; elevate injured limb if appropriate.

Checklist — Bleed/TQ Pack - Gloves, gauze rolls/pads, hemostatic gauze - Tourniquet with windlass (CAT/SOF-T style) $\times 2$ - Pressure bandage, tape/elastic wrap - Shears, marker (to note TQ time)

Examples - Chainsaw leg laceration: Direct pressure fails $\rightarrow$ hemostatic packing + 3 minutes firm pressure $\rightarrow$ pressure bandage; prepare TQ if strike-through persists. - Arterial arm bleed: Immediate tourniquet high and tight; bleeding stops; time noted; treat for shock, prevent hypothermia; rapid evac.

21.9 Narrative — Three Minutes That Matter

The shirt was already soaked. You dropped to a knee, gloved, and pushed a wad of gauze straight into the deepest part of the wound. “Hold this,” someone said—“No,” you answered, “I am holding. Don’t peek.” Ninety seconds in, the edges oozed; you packed more gauze, fingertip seeking the pulsing point, then pressed again. At three minutes, you wrapped a pressure bandage, checked the distal pulse, and only then looked for a tourniquet—ready, but not needed. A jacket under and over the patient kept the shivers at bay while you called in the location and time.

21.10 Scenario

Scenario (Chainsaw gash): Deep thigh laceration; bleeding heavily. Decisions: Pressure vs tourniquet first; hemostatic packing; documentation. Outcome: You apply a high, tight tourniquet until bleeding stops, pack residual cavity with hemostatic gauze, and note TQ time on the patient. Lessons: Don’t hesitate on life-threatening limb bleeds; pack and press Drill: Pack a wound trainer (or towel in bottle) for 3 minutes without peeking.

21.11 Common Mistakes

- Peeking during pressure; lifting gauze breaks clots. Add more on top instead.
- Tourniquet too loose or over a joint; failure to note time; loosening in the field.
- Packing shallowly; not pressing directly on the bleeding source.
- Using stretchy/rope improvised TQs without a windlass; they fail under motion/pain.
- Delaying TQ on clear life-threatening limb bleeding.
- Forgetting hypothermia prevention; cold blood doesn't clot.
- Giving food/drink to unstable patients; risking aspiration and complicating care.

21.12 Key Takeaways

- Pressure works; commit to firm, sustained pressure before escalating.
- Tourniquets save lives when used early and correctly; don't loosen in the field.
- Pack deep wounds with hemostatic gauze and hold pressure long enough to clot.
- Splint and dress to protect; reassess circulation and bleeding frequently.

21.13 Cross-Links

- Survival Priorities → Rule of 3s (bleeding outranks water/food): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset to avoid frantic errors): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (reassess bleeding, adjust interventions): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (call for help early, relay TQ time): ../front-matter/03-survival-priorities.html#pace-communications-plan

Chapter 22

Environmental Injuries

22.1 Snake Bites

22.1.1 What Not To Do

No cutting, sucking, ice, electric shocks, or alcohol. Do not apply arterial tourniquets (can worsen damage). Don't try to catch/kill the snake.

22.1.2 Pressure Immobilization (where appropriate)

Used primarily for neurotoxic elapid bites (e.g., Australia; some Asian/African species). Not recommended for most North/South American pit viper bites (rattlesnakes/copperheads) due to tissue-damage risk.

- Technique: Wrap a broad elastic bandage firmly (like a snug sprain wrap) over the entire bitten limb starting distally, then immobilize with a splint; keep patient still. Check distal circulation.
- Indications: Local protocols/species. When in doubt in elapid regions, call poison control/EMS.

22.1.3 Evacuation

Keep the patient calm and still; immobilize the limb at heart level; remove rings/watches; mark swelling line/time.

- Call EMS/Poison Control; transport rapidly to antivenom-capable facility.
- Provide: Time of bite, species description/photo (only if safe), progression of swelling/pain, allergies/meds.

22.2 Insect Bites & Stings

22.2.1 Local Reactions

Cold compress 10–20 minutes; elevate; oral antihistamine for itching; monitor 24–48 h.

22.2.2 Anaphylaxis

Life-threatening allergic reaction: hives, swelling of lips/tongue, wheeze, breathing difficulty, vomiting, dizziness, drop in blood pressure.

22.2.3 Antihistamines

Oral antihistamines help itching/swelling; follow label dosing. Non-drowsy during daytime activity.

22.2.4 EpiPen Use

If prescribed or available for known allergy, give epinephrine at first sign of systemic reaction.

- Use auto-injector into outer thigh (through clothing if needed). Hold 3–10 seconds (per device); massage briefly.
- Call EMS. If symptoms persist, a second dose may be needed after 5–15 minutes.

22.3 Hypothermia

Early: Shivering, fumbling, mild confusion. Moderate/severe: Shivering stops, slurred speech, drowsy, slow pulse.

- Passive: Dry layers, wind/water block, insulate from ground; warm, sweet drinks if alert.
- Active: Body-to-body heat, heat packs to armpits/groin/neck (wrap in cloth), warmed fluids if trained. Handle gently.

22.4 Hyperthermia

Heat exhaustion: Heavy sweat, weakness, nausea; cool with shade, water, evaporation, and ORS; rest.

Heat stroke (emergency): Altered mental status, very hot skin; call EMS; aggressive cooling—douse with water and fan hard; ice to neck/groin/armpits.

22.5 Frostbite vs Trench Foot

Frostbite: Frozen tissue; numb, waxy, hard skin; blisters after rewarm. Rewarm only if refreezing risk is gone: warm water bath 37–39°C (98–102°F) 15–30 minutes; do not rub. Protect and pad; evacuate.

Trench foot: Cold-wet exposure without freezing; numb, pale/mottled, painful. Dry, warm, elevate; change socks; gradual rewarm.

22.6 Altitude Sickness

AMS: Headache, nausea, poor sleep at altitude; treat with rest, hydrate, mild pain relief; do not ascend with symptoms.

HACE (brain): Ataxia, confusion; descend immediately; oxygen if available.

HAPE (lungs): Shortness of breath at rest, cough, frothy sputum; descend immediately; oxygen; minimize exertion.

Ascent rules: Climb high, sleep low; >3,000 m (10,000 ft) increase sleeping altitude 500 m/day; rest days every ~1,000 m.

22.7 Sun & Eye Protection

Cover skin; use wide-brim hat; sunglasses with UV protection; apply/reapply sunscreen (SPF 30+). In snow/water, increase protection due to reflection.

Checklist — Environmental Injury Quick Actions - Snakebite: Immobilize, pressure immobilization in elapid regions, no cutting/sucking/ice, evac - Sting allergy: Epi for systemic signs, antihistamine, EMS - Hypothermia: Insulate ground/back, dry layers, heat packs to core - Hyperthermia: Shade, water, evaporative cooling, ORS; EMS if stroke signs - Frostbite: Warm water bath if no refreeze risk; pad and protect; evac - Altitude red flags: Ataxia or breathlessness at rest → descend now

Examples - Desert hike: Bee stings with hives/wheeze; administer EpiPen, call EMS, second dose after 10 minutes if wheeze persists; monitor airway. - Alpine camp: Mild AMS; rest day, hydrate, mild analgesic; postpone ascent; monitor for ataxia.

22.8 Key Takeaways

- Immobilize and evacuate snakebites; use pressure immobilization only in appropriate regions/species.
- Treat allergic reactions early; epinephrine saves lives—use it with systemic signs.
- Prevent and reverse thermal injuries with insulation or cooling; descend immediately with altitude red flags.

22.9 Cross-Links

- Survival Priorities → Rule of 3s (thermal and breathing outrank movement): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (avoid panic after bites/stings): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (monitor progression and pivot to evac): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (contact and rendezvous during evac): ../front-matter/03-survival-priorities.html#pace-communications-plan

22.10 Scenarios

Scenario (Regional park, snakebite): Ankle bite; triangular head, rattling nearby. Decisions: Cut/suck vs pressure vs immobilize; move or stay; evac plan. Outcome: You immobilize, keep limb at heart level, mark swelling times, and evacuate without walking far; you call Poison Control. Lessons: No cutting/sucking; immobilize and go Drill: Practice a snug pressure wrap on a partner (elapid regions).

Scenario (Bee swarm, urban): Two stings; hives spread; wheeze starts. Decisions: Epi now or wait; antihistamine; EMS. Outcome: You give Epi promptly, call EMS, and monitor airway. Lessons: Early Epi saves lives Drill: Train with an Epi trainer until it's automatic.

Chapter 23

Burns & Eye/Dental Emergencies

23.1 Burns

23.1.1 Cool-Water Rule

Cool the burn promptly with cool (not cold) clean water for 10–20 minutes. Start as soon as possible, up to 3 hours after injury. Avoid ice/ice water which can worsen tissue damage.

23.1.2 Covering

After cooling, cover loosely with clean, non-adherent dressing or plastic wrap. Do not apply butter/oils/ointments initially. Remove rings/watches before swelling.

23.1.3 When to Evacuate

Seek medical care for:

- Partial-thickness burns >10% total body surface area (TBSA) in adults or any size in children/elderly
- Burns to face, hands, feet, genitals, or major joints
- Circumferential burns of limbs or chest
- Inhalation injury (soot around nose/mouth, hoarseness), electrical or chemical burns
- Signs of infection (increasing pain, redness, pus, fever)

23.2 Eye Injuries

23.2.1 Flush

For chemical exposures, flush immediately with copious clean water or saline for at least 15–20 minutes; hold eyelids open; roll eyes to expose all surfaces.

23.2.2 Patch

Do not put pressure on a suspected penetrating injury. Use a rigid eye shield (or taped paper cup) rather than a pressure patch; evacuate urgently.

For minor corneal abrasions (no vision change, no foreign body): Light patch for comfort; avoid contacts; consider medical evaluation.

23.3 Dental Emergencies

23.3.1 Broken Tooth

Rinse mouth gently; cover sharp edges with dental wax/sugarless gum; pain control per OTC guidance; avoid heat/cold extremes.

23.3.2 Preservation Medium

For an avulsed (knocked-out) adult tooth: Handle by the crown (white part), not the root; gently rinse debris (don't scrub); if the patient is conscious and cooperative, reimplant immediately and have them bite on gauze. If not, store in Save-a-Tooth solution, cold milk, or saliva (cheek pouch). Seek dental care urgently—best outcomes within 30–60 minutes.

Checklist — Burns/Eye/Dental - Cool burns 10–20 minutes; no ice/oils; remove constricting items - Cover with clean, non-adherent dressing; monitor for infection - Eye chemicals: flush 15–20 minutes; shield penetrating injuries - Dental avulsion: handle crown only; reimplant or place in milk/specified medium; urgent dental care

Examples - Cooking spill: Partial-thickness burn to forearm; cool 15 minutes; cover with clean film; elevate; seek care if large or circumferential. - Lye splash: Immediate continuous eye irrigation 20 minutes; remove contacts; shield and evacuate.

23.4 Key Takeaways

- Prompt cooling limits burn depth; avoid ice and home remedies.
- Protect the airway and eyes; shield, don't press, for penetrating injuries.
- Reimplant adult teeth immediately when feasible; time is critical.

23.5 Cross-Links

- Survival Priorities → Rule of 3s (airway/thermal considerations): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (prevent frantic, harmful actions): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (cool, cover, reassess, plan care): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (coordinate evac and handoff): ../front-matter/03-survival-priorities.html#pace-communications-plan

23.6 Scenarios

Scenario (Kitchen scald): Pot tips on forearm. Decisions: Ice vs cool water; ointments; rings. Outcome: You cool under running water 15 minutes, remove ring, cover with clean film, and monitor. Lessons: Cool-water rule; remove constrictors early Drill: Time yourself cooling for the full 15 minutes.

Scenario (Shop lye splash): Eye burning. Decisions: Flush vs patch; duration; contacts. Outcome: You flush continuously 20 minutes, remove contacts, shield, and evacuate. Lessons: Irrigate early, long, and lots; shield don't press Drill: Stage a 1-L eyewash at home/shop.

Chapter 24

Illness & Waterborne Disease

24.1 Overview

GI illness saps fluids and energy. Your priorities are hydration, electrolytes, and preventing spread. Most cases resolve with supportive care; know red flags for evacuation.

24.2 Diarrhea Management

Most field GI illness resolves with rest and fluids. The priority is hydration and electrolyte replacement.

- Fluids: Oral rehydration solution (ORS) in small, frequent sips.
- Diet: Bland foods as tolerated (rice, oats, crackers); avoid dairy/fatty foods initially.
- Hygiene: Wash/sanitize hands; segregate cook gear; treat water carefully.
- Red flags: Blood in stool, high fever, severe abdominal pain, persistent vomiting preventing fluids, signs of severe dehydration (no urine 8+ hours, lethargy/confusion). Evacuate/seek medical care.

24.3 ORS Recipe

1 L safe water + 6 level tsp sugar + 1/2 level tsp salt. Stir until dissolved; taste should be lightly salty, not briny.

- Administration: Adults: frequent small sips; children: 5–10 mL every 1–2 minutes; increase as tolerated.
- Variants: Commercial ORS packets; half-strength sports drink + pinch of salt if nothing else.

24.4 Anti-Diarrheals — When to Use/Avoid

Use cautiously.

- Loperamide: May reduce stool frequency for non-bloody, non-febrile diarrhea (e.g., traveler's diarrhea) in adults. Avoid if blood, high fever, or suspected invasive infection.
- Bismuth subsalicylate: May reduce symptoms; avoid in salicylate allergy, children with viral illness (Reye's risk).
- Antibiotics: Prescription-guided for specific scenarios; not covered here.

Checklist — GI Management - Confirm safe water supply and multi-barrier treatment - Mix ORS correctly; deliver small, frequent sips - Separate sick person's utensils; strict hand hygiene - Monitor hydration (urine output, mentation) - Evacuate with red flags (blood, fever, severe dehydration)

Examples - Traveler's diarrhea: No blood/fever; ORS + rest; optional loperamide for essential travel; improve within 24–48 h. - Backcountry group: Two sick with vomiting; institute hand hygiene, separate cooking kit, treat water more rigorously; plan slow exit.

24.5 Key Takeaways

- Hydration and electrolytes are the main treatment; mix ORS precisely.
- Avoid anti-diarrheals in bloody diarrhea or high fever; seek care.
- Prevent spread with strict hygiene and better water treatment.

24.6 Cross-Links

- Survival Priorities → Rule of 3s (hydration priority vs exertion): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause to prevent group spread): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (reassess hydration status, adapt plan): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (check-ins if deteriorating): ../front-matter/03-survival-priorities.html#pace-communications-plan

24.7 Scenario

Scenario (Camp GI spread): Two of four have diarrhea after a river swim. Decisions: Keep moving vs rest; anti-diarrheals; hygiene controls. Outcome: You rest, mix ORS, improve water treatment, separate cook gear, and recover next day. Lessons: Hydration + hygiene > speed Drill: Pack ORS packets in each kit and learn the home recipe by heart.

Chapter 25

Evacuation, Triage & Handover

25.1 START

Simple triage to prioritize care in multi-patient incidents.

- RPM: Respirations, Perfusion, Mental status.
- Respirations: Not breathing → open airway; if still not breathing, tag Black (deceased/expectant). Breathing >30/min → Red (immediate).
- Perfusion: Cap refill >2 s or no radial pulse → Red.
- Mental status: Cannot follow commands → Red; can follow → Yellow (delayed) if not Red; walking wounded → Green (minor).

25.2 SALT

Structured approach from initial sort to transport.

- Sort: Identify those who can/will walk (Green), wave (Yellow), and still (possible Red/Black).
- Assess: Quick look for life-threats.
- Lifesaving interventions: Control major bleed, open airway, chest seals, recovery position.
- Treatment/Transport: Assign priority based on condition and resources.

25.3 Packaging Patients

Protect the patient during movement.

- Spinal considerations: Inline stabilization if mechanism suggests; minimize movement.
- Litter: Use commercial or improvised (poles + tarp/blankets). Practice before you need it.
- Hypothermia: Wrap in insulating layers and a wind/water barrier (hypo wrap/bivy); insulate from ground.
- Monitor: Reassess vitals en route; secure dressings and splints.

25.4 Handoff Information

Give a concise, structured report to higher care.

- MIST: Mechanism of injury/illness, Injuries found, Signs (vitals), Treatments given.
- SAMPLE: Symptoms, Allergies, Medications, Past history, Last intake, Events.
- Times: Onset, treatment times (tourniquet application, medications), last vitals.

Checklist — Evac/Triage/Handover - Triage tags or clear prioritization (Red/Yellow/Green/Black) - Immediate lifesaving interventions done (bleeding, airway, chest) - Hypothermia prevention in place - Safe packaging for transport; monitor en route - Handoff uses MIST + SAMPLE; times documented

Examples - Multi-bike crash: Direct pressure/TQ on severe bleed; START triage assigns Red/Yellow/Green; call EMS; MIST handoff with TQ time, vitals trends. - Remote ankle fracture: Splint and hypo wrap; slow carry with frequent checks; handoff with mechanism, neuro checks before/after splint, pain course.

25.5 Key Takeaways

- Triage fast and fairly; lifesaving interventions come before detailed treatment.
- Prevent hypothermia and secure packaging; reassess continuously during movement.
- Deliver structured handoffs (MIST/SAMPLE) with times to speed higher care.

25.6 Cross-Links

- Survival Priorities → Rule of 3s (airway/bleeding/thermal): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset if overwhelmed): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (update triage and plan as resources change): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (coordinate rendezvous/transport): ../front-matter/03-survival-priorities.html#pace-communications-plan

25.7 Scenario

Scenario (Multi-car collision): Three patients, varied injuries. Decisions: START vs jumping to treatment; who is Red/Yellow/Green; what to tell EMS. Outcome: You START triage quickly, control a Red bleed, hypo-wrap, and deliver a MIST report with times. Lessons: Sort fast, lifesave first, then transport Drill: Practice START with friends in 3 minutes.

Part VII

Part VII — Automotive & Transport (Legal, Safe, Practical)

Chapter 26

Vehicle Readiness & Inspection

26.1 Overview

Most roadside emergencies are preventable. A 5–10 minute pre-trip inspection reduces breakdowns and makes minor issues manageable. Keep a minimal kit in the vehicle and adapt for season and terrain.

26.2 Pre-Trip Checks

Quick walkaround + dash scan.

- Tires: Pressure (placard in door jamb), tread depth (3 mm/4⁄32” for wet), sidewall damage, valve caps.
- Fluids: Oil, coolant overflow level, washer fluid; look for leaks under vehicle.
- Lights: Headlights, brake, reverse, turn signals, hazards.
- Wipers: Condition and operation; carry spares in harsh climates.
- Dash: Warning lights off? Check engine/service lights noted.

26.3 Belts & Hoses

Inspect for cracks, glazing, fraying; hoses for bulges, soft spots, or leaks. Squeeze radiator hoses (cool engine) — firm, not mushy.

26.4 Tire Health

Use a gauge; inspect tread wear patterns (center wear = overinflated, edges = underinflated, cupping = suspension issues). Verify spare or repair kit readiness.

26.5 Lights

Carry a spare bulb/fuse where practical; clean lenses; aim headlights properly.

26.6 Critical Spares

Pack items that fix common issues:

- Tire repair: Plug kit, compact compressor, pressure gauge

- Electrical: Assorted fuses, basic test light
- Fluids: Washer fluid; small oil/coolant top-off (correct type)
- Tools: Jack, lug wrench, gloves, flashlight, triangle/flares, jumper cables or jump pack
- Seasonal: Blanket, shovel, traction aids (sand, mats), ice scraper, water

Checklist — Readiness Kit (Basic) - Tire plug kit + compressor - Jumper cables or jump pack (charged) - Triangle/flares/high-viz vest - Gloves, flashlight/headlamp, shop towels - Fuses, basic tools (screwdrivers, pliers, adjustable wrench) - Fluids: washer, correct oil/coolant - Blanket, water, snacks (season/region specific)

Examples - Mountain trip: Increase tire pressure to placard; pack chains if required; add coolant rated for low temps; bring extra washer fluid. - Summer highway: Check AC belt condition; test spare; pack water and sun protection.

26.7 Key Takeaways

- Ten minutes of checks prevent hours of roadside problems.
- Tires, fluids, and lights are the high-value items; pack a minimal repair kit.
- Adjust kit and checks for season and terrain.

26.8 Cross-Links

- Survival Priorities → STOP (pause and reassess when a warning light appears): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (decide to continue vs pull over safely): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (check-ins on long drives): ../front-matter/03-survival-priorities.html#pace-communications-plan

26.9 Scenario

Scenario (Pre-trip save): A drywall screw in a rear tire on the walkaround. Decisions: Drive anyway vs plug now; compressor ready? Outcome: You plug the tread, air to placard pressure, and avoid a freeway shoulder change at night. Lessons: Five minutes saves hours Drill: Plug a tire on an old carcass or practice on a demo kit.

Chapter 27

Basic Troubleshooting

27.1 No-Start Triage

27.1.1 Battery

Common cause. Dome lights dim? Clicking? Measure if you can: <12.0 V = low, ~12.6 V = full. Look for corrosion/loose terminals.

27.1.2 Starter

Single loud click → solenoid engages but starter doesn't spin; repeated rapid clicks → low battery. Tap starter lightly while turning key (temporary).

27.1.3 Fuel

Listen for pump prime 1–2 seconds at key-on. Low fuel or clogged filter gives sputter/no start. Add fuel if suspect and safe.

27.1.4 Fuses

Check fuse box diagram; pull and inspect related fuses (ECM, fuel pump, IGN). Replace with same amperage only.

27.1.5 Immobilizer Indicators

Flashing key/light may indicate immobilizer lockout. Try spare key, lock/unlock cycle, or consult manual for reset.

27.1.6 Neutral/Clutch Safety Switch

Auto transmissions require Park/Neutral; manuals require clutch fully depressed. Try starting in Neutral; wiggle shifter through ranges; press clutch firmly. If it cranks in Neutral but not Park, suspect range sensor/shift linkage.

27.1.7 Relays (Starter/Fuel Pump)

Listen/feel for relay clicks at key-on. Swap a suspect relay with an identical non-critical one (e.g., horn) to test. Inspect for melted pins. Seat relays fully.

27.1.8 Security/Aftermarket Devices

Aftermarket alarms/kill-switches can block starts. Check hidden toggles or poorly crimped add-ons near battery/ignition; restore to stock if needed.

27.2 Using a Jump Pack

Safer than cables; follow device instructions.

- Off vehicle ignition; connect positive (+) to battery positive, negative (−) to engine ground (unpainted metal), not battery negative if accessible.
- Power jump pack; start vehicle; disconnect in reverse order.
- Keep bystanders clear of moving parts; avoid sparks.

27.3 Safe Jump-Start Procedure

If using another vehicle:

- Park close but not touching; both ignitions off; connect cables: dead +, donor +, donor −, dead − (to ground). Start donor; wait 3–5 minutes; start dead vehicle.
- After start: Remove cables in reverse order; keep engine running to recharge.

27.4 Alternator Quick Checks

Battery light on while driving? Dimming lights with RPM change? Measure voltage if possible: running should be ~13.8–14.4 V. If <13 V, alternator/drive belt issue.

27.5 Overheating Response

Turn off AC; turn heat on high to shed heat; pull over safely. Do not open radiator cap hot. After cool, check coolant level in overflow, belt, and leaks. Verify cooling fans run when hot or when AC is on; no cabin heat can indicate very low coolant.

Caution: Steam = stop. Don't douse a hot engine with cold water; avoid spraying water on hot electronics.

Tip: If a hose collapses as RPM rises, suspect a clogged radiator cap or blocked hose.

27.6 No-Crank vs Crank-No-Start Flow

No-crank (key turns but engine doesn't rotate) - Battery/terminals: Clean/tighten; try jump pack. - Shifter/clutch: Try Neutral; fully depress clutch; check that brake is pressed on push-button starts. - Starter/relay: Listen for single click (solenoid) vs silence; tap starter body lightly while turning key (temporary); swap starter relay with identical. - Immobilizer: Watch for key icon; try spare key; lock/unlock cycle.

Crank-no-start (engine turns but won't fire) - Fuel: Listen for 1–2 s pump prime at key-on; add safe amount of fuel if low; check fuel pump fuse/relay. - Air: Ensure air intake isn't blocked; check for rodent nests/filters soaked in water. - Spark: If safe and trained, use an inline spark tester; otherwise, read OBD-II for misfires/sensor failures; avoid pulling coils/wires on modern engines without tools. - Sensors: Loose MAF/MAP connectors or vacuum hoses can cause stalls/no start after recent work.

27.7 Limp-Home Decisions

Stop if: oil pressure light on; temp in red; brakes compromised; steering failure; charging failure at night. Continue cautiously only if risk is controlled (e.g., daytime, short distance to safe stop).

Checklist — No-Start/Overheat Kit - OBD-II reader; basic fuse kit - Jump pack/cables; gloves/eye protection - Tire plug kit + compressor; coolant rated for vehicle; funnel/rags - Flashlight/headlamp; triangles/high-viz vest

Examples - Grocery lot no-start: Dome lights dim, rapid clicking → low battery. Jump pack start; drive 20–30 minutes, test alternator soon. - Hill climb temp spike: Heater on full; safe pull-off; cool; overflow tank low—top with correct mix; inspect for leaks; plan service.

27.8 Field Tests Without Tools

- Headlight load test: Turn headlights on; crank. If lights die completely, suspect weak battery/connection; if they stay bright and no crank, suspect starter or safety switch.
- Neutral test: Try to start in Neutral instead of Park.
- Relay swap: Swap identical relays (e.g., horn starter) to isolate.
- Belt check: Press on belt mid-span; heavy cracks/glazing or very loose belts can cause charging/cooling failures.

27.9 Common Mistakes

- Opening a hot radiator cap; serious burn risk.
- Jumping with reversed polarity or clamping to battery negative instead of engine ground.
- Clearing codes before reading/recording them; losing freeze-frame data.
- Cranking endlessly and overheating the starter (let cool between attempts).

27.10 Key Takeaways

- Diagnose simply: battery/terminals, fuel, fuses, immobilizer.
- Jump safely; avoid opening hot cooling systems; decide prudently to stop vs limp.
- Basic kit covers 80% of roadside problems.

27.11 Cross-Links

- Survival Priorities → STOP (don't rush into unsafe roadside actions): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (triage symptoms, choose next step): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (inform contacts of delays): ../front-matter/03-survival-priorities.html#pace-communications-plan

27.12 Scenario

Scenario (Grocery lot no-start): Rapid clicks, dome light dim. Decisions: Battery vs starter; jump pack vs call; immobilizer light? Outcome: You spot a loose terminal, tighten, jump with a pack, and drive to test the alternator. Lessons: Terminals first; jump packs are gold Drill: Identify your fuse box and battery tie-downs at home.

Chapter 28

Basic Vehicle Fluids

28.1 Overview

Fluids are your vehicle's blood and cooling system. Use the correct type, check levels safely, and top off thoughtfully. When in doubt, consult the owner's manual or the under-hood labels.

28.2 Engine Oil Types

Viscosity and specification matter.

- Viscosity: 0W-20, 5W-30, etc. Match manual/hood sticker.
- Specs: Look for API/ACEA approvals required by your engine.
- Top-off: Check dipstick on level ground with engine off and cool; add small amounts; avoid overfill.

28.3 Coolant Types

Not all coolants mix. Use the specified type.

- Types: OAT/HOAT/IAT; colors vary by brand—don't trust color alone.
- Overflow tank: Check level cold; add premix of the correct type.
- Radiator cap: Never open hot; use a rag; open slowly when cool.

28.4 Brake Fluid

Critical for stopping; absorbs water over time.

- Types: DOT 3/4/5.1 are glycol-based and mixable; DOT 5 (silicone) is not—don't mix with others.
- Reservoir: Keep clean; avoid contaminating with oil/grease; cap quickly.

28.5 Power Steering Fluid

Types vary; some use ATF. Check manual/cap label. Check level with engine off (or as manual states).

28.6 Washer Fluid

Use seasonal blends (de-icer in winter). Fill to near top; avoid plain water in freezing climates.

28.7 Top-Off Cautions

Avoid cross-contamination and burns.

- Identify caps clearly; read labels; keep funnels separate for oil/coolant.
- Let hot engines cool before opening pressurized systems.

Checklist — Fluids Quick Guide - Oil: correct viscosity/spec; add small amounts; recheck dipstick - Coolant: correct type; fill overflow; never open hot radiator - Brake: correct DOT; keep clean; don't spill on paint - Power steering: correct fluid (may be ATF); check as directed - Washer: seasonal blend; keep topped

Examples - Low oil light: Park level; wait 5 minutes; check dipstick; add 0.5 L of specified oil; recheck; investigate leak/consumption soon. - Overheat after climb: Cool down; top overflow with correct premix; do not open hot cap; plan coolant system check.

28.8 Key Takeaways

- Use the right fluid type; avoid mixing unknown coolants and DOT 5 with others.
- Check levels safely; hot systems can injure.
- Keep separate funnels/containers to avoid contamination.

28.9 Cross-Links

- Survival Priorities → STOP (cool down before opening caps): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (decide whether to continue vs service now): ../front-matter/03-survival-priorities.html#ooda

28.10 Scenario

Scenario (Coolant mixup averted): Steam after a climb; you're low. Decisions: Open hot cap vs overflow; type check; limp vs stop. Outcome: You cool, top the overflow with correct mix, avoid opening the cap hot, and get service later. Lessons: Don't mix unknown coolants; never open hot Drill: Find your coolant spec on the cap/manual.

Chapter 29

On-Road Emergencies

29.1 Overview

Stay visible, stabilize the scene, and fix the problem without introducing new hazards. If conditions are unsafe (limited shoulder, poor visibility), call for professional help and prioritize occupant safety away from traffic.

29.2 Flats

29.2.1 Jack Points

Use the owner's manual diagram; typical points are reinforced pinch welds or frame pads. Never crawl under a vehicle supported only by a jack.

29.2.2 Lug Sequence

Loosen lugs 1/4–1/2 turn in a star pattern before lifting. After wheel on, hand-tighten in star; torque to spec after lowering.

29.2.3 Torque

Typical passenger cars: 80–110 ft-lb—check manual. Re-torque after 80–100 km (50–60 mi).

29.2.4 Plug/Patch Kits

For tread punctures (not sidewalls). Remove object, ream hole, insert plug with cement, inflate and check for leaks. Consider as temporary repair.

29.2.5 Donut Limits

Max ~50 mph (80 km/h) and 50–100 mi (80–160 km) depending on tire. Handling/braking reduced; avoid highways if possible.

29.3 Stuck Vehicle Basics

Clear around tires; lay traction aids (sand, mats, branches); use gentle rocking (forward/reverse) without over-revving; turn off traction control if manual recommends for rocking.

29.4 Scene Safety

Pull as far off as safely possible; turn wheels away from road; hazards on; high-viz vest. Place triangles: ~10 m, 100 m behind (adjust for speed/curves).

29.5 Fire Risk Near Fuel Leaks

No smoking/open flame; shut off engine; evacuate downwind and uphill if possible; call emergency services.

Checklist — Roadside Flat Fix - Safe location; hazards/triangles; high-viz on - Loosen lugs; jack at correct point; wheel chocked - Swap wheel; star-pattern tighten; lower; torque - Stow damaged tire; recheck torque after 80–100 km

Examples - Night freeway: Triangle placement increased; call roadside; wait behind guardrail if available; only attempt wheel change if fully protected. - Gravel pullout: Plug tread puncture, inflate to placard pressure, plan shop patch.

29.6 Key Takeaways

- Visibility and scene control first; don't become a casualty.
- Use proper jack points and star pattern; respect donut limits.
- Plug only tread punctures; patch at shop ASAP.

29.7 Cross-Links

- Survival Priorities → STOP (pause before stepping into traffic): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (scene control → fix → reassess): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (notify contacts of delay/location): ../front-matter/03-survival-priorities.html#pace-communications-plan

29.8 Scenario

Scenario (Night flat, tight shoulder): Traffic fast; little room. Decisions: Change here vs call; triangle placement; donut limits. Outcome: You call roadside, place triangles far back, wear high-viz, and wait behind a barrier. Lessons: Visibility and space beat DIY under risk Drill: Practice star-pattern torque on a safe driveway.

Chapter 30

Movement Without Driving

30.1 Overview

Sometimes you need to move a vehicle that won't start or shift. Use manufacturer-approved methods to put the transmission in neutral, and move/push/tow safely with clear communication. Never defeat security or operate illegally.

30.2 Neutral Override

Modern vehicles often have a hidden shifter release.

- Check manual: Look for "shift lock release" near the shifter; often a small cover hides a slot for a key/tool.
- Electric parking brakes: Some vehicles require a specific procedure or power to release; consult manual.

30.3 Pushing Safely

Assign a driver to steer/brake with ignition in accessory if needed (no power steering/brakes may increase effort). Push from structural areas; do not place feet behind wheels; use spotter hand signals.

30.4 Calling a Tow

Know your location and needs.

- Provide: Vehicle make/model, issue (won't start/flat), location (with landmarks/coords), where to tow.
- Request: Flatbed vs wheel-lift per drivetrain; ask about ETA and safety instructions.

30.5 Winch Basics (If Equipped)

Respect line forces and safety zones.

- Anchor: Solid tree/vehicle with tree-saver strap; straight line pulls preferred.
- Setup: Gloves on; use dampener/blanket mid-line; keep bystanders well clear; never straddle a loaded line.
- Communication: One leader controls the operation; clear start/stop signals.

30.6 Legal/Ethical Access to Keys

Only move/enter vehicles with owner consent or under direction of authorities. Use locksmiths or roadside assistance for lockouts. Document actions if you move an unattended vehicle at official request.

Checklist — Move Without Driving - Confirm neutral (per manual); parking brake status known - Spotters positioned; clear hand signals; path checked - Push/pull slowly; never place body where it can be pinned - Stop if steering/braking insufficient; escalate to tow

Examples - Dead battery in garage: Shift lock release to neutral; two pushers + one driver; small chocks ready; roll to open drive for jump. - Stuck in mud: Reduce tire pressure slightly; clear in front of drive wheels; gentle rocking; if winching, dampen line and set wide safety perimeter.

30.7 Key Takeaways

- Use designed neutral releases; don't force transmissions.
- Communicate clearly; small controlled moves beat risky lunges.
- Call a tow when conditions exceed manpower, gear, or safety.

30.8 Cross-Links

- Survival Priorities → STOP (don't rush into crush zones): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (choose push vs tow vs wait): ../front-matter/03-survival-priorities.html#ooda

30.9 Scenario

Scenario (Garage push): Dead battery, car nose-in. Decisions: Shift lock; pushers; chocks; comms. Outcome: You use the shift lock, assign one driver + two pushers + one spotter, set small chocks, and roll out cleanly for a jump. Lessons: Roles + signals = safe micro-moves Drill: Find and test your shift-lock release.

Chapter 31

OBD-II for Humans

31.1 Overview

OBD-II readers turn warning lights into clues. Read codes, interpret the severity, and decide whether to stop, continue cautiously, or seek service. Don't clear codes blindly—you may erase valuable diagnostic data.

31.2 Code Readers

Simple tools that pay for themselves quickly.

- Standalone: Plug in, read/clear codes, see freeze-frame data.
- Bluetooth: Pair with phone apps for more data and logging.

31.3 Common Codes

31.3.1 Misfire (P0300-series)

Rough running, flashing MIL (malfunction indicator light) = severe misfire. Reduce speed; avoid heavy load; stop if flashing persists to prevent catalytic damage.

31.3.2 EVAP System

Loose/faulty gas cap common; tighten/replace. Usually safe to drive; schedule service.

31.3.3 O2 Sensor

Upstream sensor affects fuel mixture; downstream monitors catalytic converter. Codes may reduce fuel economy/performance; usually not immediate emergencies.

31.4 When to Stop vs Continue

Stop now: Oil pressure light, temperature in red, brake warning with soft pedal, steering failure, flashing MIL with power loss.

Continue cautiously: Solid MIL with stable performance; EVAP codes; O2 sensor codes—avoid hard acceleration/heavy loads; plan service.

31.5 Clearing Codes Pitfalls

Clearing codes erases freeze-frame and readiness monitors. This can hide intermittent problems and cause inspection failures until monitors reset.

Checklist — OBD-II Use - Read codes before changing anything; note freeze-frame data - Decide stop/continue based on severity, not annoyance - Don't clear codes unless directed; record codes for the shop - Recheck after repairs; ensure readiness monitors complete before inspection

Examples - Solid MIL after fuel stop: Read EVAP small leak; tighten cap; drive 2–3 cycles; light may clear on its own. - Flashing MIL on hill: Back off throttle; exit safely; tow to shop to avoid damage.

31.6 Key Takeaways

- OBD-II gives you the why behind the light; act on severity.
- Many codes allow cautious driving; some demand immediate stop.
- Don't clear codes blindly—you erase the evidence a tech needs.

31.7 Cross-Links

- Survival Priorities → STOP (pull over safely before investigating): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (decide stop vs continue, then reassess): ../front-matter/03-survival-priorities.html#ooda

31.8 Scenario

Scenario (Flashing MIL on grade): Car stumbles, light flashes. Decisions: Push to the top vs exit now; read codes or tow. Outcome: You back off, exit safely, read a P0303 misfire, and tow to avoid catalyst damage. Lessons: Flashing MIL = stop soon; code first, then plan Drill: Plug in your reader at home and read a sample code.

Part VIII

Part VIII — Tools, Knots & Improvisation

Chapter 32

EDC, Get-Home, and 72-Hour Kits

32.1 Overview

Pack by layers—not by fantasy. Everyday Carry (EDC) stays on you; the Get-Home Bag (GHB) lives where you are during the day; the 72-Hour Kit covers short disruptions. Tune for season, climate, and your realistic scenarios.

32.2 Layered Loadouts

Person, bag, vehicle, home.

- Person (EDC): ID, phone, small light, whistle, small multitool/knife (legal), bandanna, basic first aid (bandages), cash (small bills), key PACE plan.
- Get-Home Bag (12–24 h): Water, filter, electrolytes, snacks, weather layer, hat/gloves, socks, small first aid/bleeding control, headlamp, map/compass, cordage, tape, battery bank, mask, simple tools.
- Vehicle: Readiness kit (tire, jump, fluids), blanket, water, extra food, triangles/high-viz, paper maps.
- Home (72-hour): Water (4 L/person/day), shelf-stable food, stove/fuel, light/lanterns, batteries, charger/inverter, sanitation, meds, tools, radio.

32.3 Seasonal Variations

Cold: Insulation layers, beanie, gloves, hand warmers, emergency bivy, de-icer. Hot: Electrolytes, sun protection, brim hat, lightweight long sleeves, foot care kit.

32.4 Weight/Benefit Math

Choose items you'll actually carry. Favor multi-use gear; cut dead weight.

Checklist — GHB Basics (~6–9 lb / 3–4 kg) - Water 1–2 L + filter or tabs; electrolyte packets - Food 1,500–2,500 kcal no-cook - Clothing: insulation, rain shell, socks, hat/gloves (seasonal) - Navigation: map, compass, pen/paper; local transit map - Light: headlamp + spare batteries - First aid: bandages, blister kit, gloves; bleeding control if trained - Tools: multitool, tape, 10–15 m cordage, lighter/ferro rod - Comms: battery bank + cable; PACE card; small radio if used

Examples - Office commuter: Slim GHB under desk with shoes, socks, map, food/water, light jacket, battery bank; quarterly refresh. - Rural driver: Vehicle kit emphasized—water, blankets, traction aids, shovel, paper maps, extra fuel if safe/legal.

32.5 Key Takeaways

- Build layers aligned to where you spend time; keep weight realistic.
- Seasonalize quarterly; rotate food/water/batteries.
- Keep PACE card and local maps in each layer.

32.6 Cross-Links

- Survival Priorities → Rule of 3s (prioritize thermal and water in kits): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset during kit use to avoid waste): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → PACE Comms Plan (backup contacts and times in kits): ../front-matter/03-survival-priorities.html#pace-communications-plan

32.7 Scenario

Scenario (Office evac walk): Transit down, 14 km home. Decisions: Shoes vs dress flats; water; route; weight. Outcome: You change to trail runners and socks from the GHB, sip steadily, and walk a safe route in 3 hours. Lessons: Weight you carry is the kit you use Drill: Weigh your GHB and try a 5 km loop.

Chapter 33

Core Tools & Safe Use

33.1 Overview

Tools save time and energy when used deliberately. The best tool is the one you can use safely under stress. Keep edges sharp, grips secure, and work areas controlled.

33.2 Knife

Grips, cuts, and care.

- Grips: Hammer (power), pinch (control). Keep your off-hand behind the edge.
- Cuts: Cut away from body; use chest-lever cuts and supported carving for control.
- Surface: Cut on stable surfaces; baton only with appropriate tang/steel and safe technique.
- Care: Dry, clean, oil lightly; sharpen regularly.

33.3 Multitool

Use pliers for hot pots, wire, and small fixes; fold tools properly. Beware pinch points.

33.4 Saw

Pull strokes do the work; let the saw cut—don't force. Wedge kerfs to prevent binding; clear the cut path.

33.5 Blade Care

Carry a small sharpener; touch up often. Lubricate pivots; store dry.

33.6 PPE

Gloves, eye protection, sturdy shoes. Tie back hair; avoid loose clothing.

33.7 Sharps Discipline

Announce "knife" when passing; sheath when not in use; set a blood bubble (arm's reach safety zone).

Checklist — Tool Safety - Stable stance and surface - PPE on; blood bubble clear - Cut away; control blade path; keep off-hand safe - Sheath/tools stowed after use

Examples - Fire prep: Feather sticks with chest-lever cuts; saw branches with wedged kerf; no batoning on rocky ground. - Food prep: Dedicated clean knife and board; sanitize after raw meats.

33.8 Key Takeaways

- Sharp + controlled beats dull + forceful.
- PPE and discipline prevent most injuries.
- Maintain tools; small, frequent sharpening avoids big repairs.

33.9 Cross-Links

- Survival Priorities → Rule of 3s (tools serve thermal/water priorities): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (pause if conditions become unsafe): ../front-matter/03-survival-priorities.html#stop

33.10 Scenario

Scenario (Saw bind avoided): Limb under load; saw starts to pinch. Decisions: Force vs wedge; change cut; PPE. Outcome: You wedge the kerf, change the angle, and finish safely. Lessons: Let the saw cut; wedge binds Drill: Practice kerf wedging on scrap wood.

Chapter 34

Cordage & Knots

34.1 Overview

A small set of knots solves most field problems: securing loads, building shelters, and creating adjustable lines. Practice until you can tie them in the dark and under stress.

34.2 Square Knot

Join same-diameter lines; not for critical loads. Right over left, left over right. Secure with backups or use a sheet bend instead.

34.3 Bowline

Fixed loop that doesn't slip. "Rabbit comes out of the hole, around the tree, back into the hole." Leave a long tail; secure with a stopper (Yosemite finish optional).

34.4 Clove Hitch

Quick midline/anchor tie-off. May slip on slick lines or with changing loads; back up with a half hitch.

34.5 Constrictor Knot

Excellent binding knot; holds tight, difficult to release—use when you can cut free later.

34.6 Taut-Line Hitch

Adjustable friction hitch for guylines. Two wraps toward the anchor, one away; slides to tension, holds under load.

34.7 Trucker's Hitch

Creates ~2:1 mechanical advantage to cinch loads/tarps. Anchor → loop (slip knot) → through anchor → back to loop → pull tight → finish with half hitches.

34.8 Sheet Bend

Join lines of unequal diameter; more secure than square knot. Add a second turn (double sheet bend) for slippery lines.

34.9 Prusik

Slides when slack, grabs when loaded. Cord ~60–80% of rope diameter; 2–3 wraps common. Use for emergency progress capture or adjustable loops.

34.10 Lashings

Square for right-angle frames; diagonal to stabilize crossed spars; shear to make folding bipods. Finish with frapping turns to cinch tight.

34.11 Improvised Harness/Drag

Seat harness from webbing (water knot to join ends); tarp/sled drags for short moves with multiple helpers; watch for spinal concerns.

34.12 Simple 3:1 Z-Drag (Caution)

For light recovery only with proper anchors and pulleys. High forces build quickly; use gloves, clear zones, and real rescue training for human loads.

Checklist — Shelter Tension Lines - Bowline on tarp grommet; trucker's hitch to anchor - Taut-line on stakes for adjustability - Backup slippery hitches; check after wind gusts

Examples - Tarp A-frame: Bowlines at corners; ridge with trucker's hitch; guylines with taut-lines; clove hitch + backup to poles. - Load tie-down: Trucker's hitch to cinch, finish with two half hitches; inspect after first mile.

34.13 Key Takeaways

- Practice a core set: bowline, trucker's hitch, taut-line, sheet bend, clove, constrictor, prusik.
- Back up slippery/simple hitches; inspect under load.
- Use appropriate cord/rope sizes; avoid shock loading improvised systems.

34.14 Cross-Links

- Survival Priorities → STOP (retie if unsure): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → OODA (adjust tension as conditions change): ../front-matter/03-survival-priorities.html#ooda

34.15 Scenario

Scenario (Storm tarp holds): Wind shifts at 02:00. Decisions: Re-tie corners; add trucker's hitch; adjust taut-lines. Outcome: You tighten guylines with trucker's hitches, reset taut-lines, and sleep through the squall. Lessons: Bowline + trucker's + taut-line = shelter toolkit Drill: Tie these three knots in under 60 seconds, eyes closed.

Chapter 35

Repair & Make-Do

35.1 Overview

Improvisation keeps you moving. A small repair kit and a few techniques can fix gear, seal leaks, and create tools. Think: tape + wire + needle + adhesive.

35.2 Tape

Duct (general), medical (skin/splints), electrical (insulation), Tenacious/repair (fabrics/tents). Fold “tabs” on ends for gloved use.

35.3 Wire

Soft steel or baling wire binds, splints, and secures. Deburr ends; avoid skin punctures; tape sharp twists.

35.4 Sewing

Sail/curved needles + heavy polyester thread; backstitch for strength; add patches with contact adhesive + stitching.

35.5 Epoxy

Two-part putty fills cracks, rebuilds threads; cures even when damp (check product). Roughen surfaces; clamp while curing.

35.6 Bottle & Can Hacks

Cut bottles into funnels/scoops; cans into windshields/pot stands (deburr edges); foil as reflector.

35.7 Reflectors & Containers

Space blanket as signal or radiant barrier; nested bags/liners to store water; label clean vs dirty.

35.8 Zippers, Buckles, and Straps

- Zipper slider pinch: Many “broken” zips are loose sliders. Pinch the slider gently with pliers to restore grip on teeth; replace lost pulls with cord.
- Buckles: Carry spare side-release buckles that thread onto existing webbing; field-replace broken pack buckles without sewing.
- Webbing repairs: Bar-tack by hand (tight back-and-forth stitches) or fold-over and stitch through with heavy thread; reinforce with tape until home fix.

35.9 Footwear Patches

- Sole peel: Clean/dry; contact cement both sides; wait until tacky; press and clamp overnight.
- Laces: Replace with paracord inner strands in a pinch; tape lace tips to form aglets.

35.10 Adhesives & Cure Windows

Contact cements (Barge, repair glues) need time: apply thin coats to both surfaces, wait until tacky, then press. Epoxies vary—carry the label or note cure times.

Checklist — Micro Repair Kit - 2 m heavy tape (flat-packed), 2 m electrical tape - Baling wire or twist ties; zip ties assortment - Heavy needle + strong thread; small sail needle; safety pins - 2-part epoxy putty; small tube contact cement - Spare buckles/webbing; patches; sandpaper scrap

Narrative — The Strap That Didn’t End the Trip Halfway up the trail, your pack’s hip-belt buckle snapped on a rock. The trip wasn’t over. You threaded a field-replaceable buckle onto the webbing, pinched a stubborn zipper slider back to life on a pocket, and wrapped a frayed strap end with tape to stop the creep. Ten minutes later you were moving again—with notes to order real parts at home.

Examples - Tent pole crack: Splint with tent stake and tape; reinforce with wire; plan replacement. - Leaky bottle: Dry thoroughly; patch with tape + adhesive; use as non-potable container.

35.11 Key Takeaways

- Tape + wire + needle + epoxy fix most field failures.
- Deburr and reinforce; label containers as clean/dirty.
- Flat-pack supplies to fit every kit layer.

35.12 Cross-Links

- Survival Priorities → Rule of 3s (repairs support shelter/water priorities): ../front-matter/03-survival-priorities.html#rule-of-3s

35.13 Scenario

Scenario (Tent pole snap): Wind cracks a pole at camp. Decisions: Pack up vs splint; materials. Outcome: You sleeve with a stake, tape tight, add wire wrap, and finish the trip. Lessons: Tape + wire + spare stake = portable sleeve Drill: Pre-pack a flat tape roll and short wire wrap.

Part IX

Part IX — Power, Light & Electronics

Chapter 36

Battery Basics

36.1 Overview

Power keeps lights, comms, and navigation alive. Choose the right cells, store them properly, and estimate runtime to plan usage. Cold saps performance—keep batteries warm.

36.2 Chemistries

Different jobs, different cells.

- Alkaline: Cheap, common; poor cold performance; risk of leakage in storage.
- NiMH (rechargeable AA/AAA): Good cold performance; low-self-discharge types (e.g., Eneloop) store well.
- Li-ion (18650/21700/phone packs): High energy density; good cold performance; needs proper chargers.

36.3 Capacity in Context

- mAh vs Wh: Convert to Wh for apples-to-apples. Wh (mAh × nominal voltage) ÷ 1000. AA NiMH ~1.2 V, Li-ion ~3.6–3.7 V.
- Estimating power bank reality: A "10,000 mAh" (at 3.7 V) is ~37 Wh; expect ~30–33 Wh usable after conversion losses.

36.4 Series vs Parallel

Series adds voltage; parallel adds capacity (current/runtime). Match cell types and states; do not mix new/old cells or chemistries. Use protected packs when possible.

36.5 Cold-Weather Care

Keep cells warm close to the body; insulate devices; warm spare cells in a pocket; expect reduced capacity.

36.6 Estimating Runtime

Runtime (h) capacity (mAh) ÷ draw (mA). Duty cycle extends life: a headlamp at 200 mA with a 3,000 mAh 18650 runs ~15 h at 100% on—more at lower modes and intermittent use.

36.7 Safety Notes (Li-ion)

- Use reputable cells and chargers; avoid damaged wraps; store spares in cases, not loose with metal.
- Don't fully discharge Li-ion regularly; store long-term at ~40–60% in a cool place.

Checklist — Power Planning - Inventory devices and cell types (AA/AAA/18650/USB-C) - Bring spares: at least one full extra set per critical device - Standardize where possible (same cells across headlamps) - Pack chargers/cables; verify current draw and connectors - Protect from cold/wet; store lithium at ~40–60% for long term

Examples - Winter hike: Headlamp on low (10–30 lm) for nav; warm spare 18650 in inside pocket; power bank kept warm for phone. - Home blackout: NiMH AAs rotated; lantern on low; device charging plan by priority.

36.8 Common Mistakes

- Mixing new and old cells or chemistries in series devices; leaks and failures.
- Storing alkalines in devices long-term; leakage damages gear—remove for storage.
- Pocketing bare Li-ion cells with keys/coins; shorting/fire risk—use cases.
- Charging unattended with cheap/unvetted chargers; prefer reputable, protected chargers.
- Leaving cells in hot cars or freezing conditions for long periods; capacity loss/damage.

36.9 Key Takeaways

- Standardize cells; plan duty cycles; keep batteries warm.
- Match series/parallel properly; don't mix old/new cells.
- Bring at least one full spare set for critical devices.

36.10 Cross-Links

- Survival Priorities → OODA (power check cycles and priorities): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (charging windows, device priorities): ../front-matter/03-survival-priorities.html#pace-communications-plan

36.11 Scenario

Scenario (Winter headlamp save): 0°C and windy; light dims. Decisions: Swap cell now; warm spare; duty cycle. Outcome: You warm a spare 18650 in a pocket, swap, and finish safely on low mode. Lessons: Warm cells work; spares buy safety Drill: Standardize your devices on one cell type if possible.

Chapter 37

Charging & Generation

37.1 Overview

Charge smart, safely, and with an eye on carbon monoxide risks. Use vehicles, solar, and generators effectively without damaging equipment or endangering people.

37.2 Vehicle Alternator Use

Useful backup if used cautiously.

- Idling charges slowly; better to drive if safe; watch fuel.
- Use proper inverters/USB adapters; avoid overloading the cigarette/accessory socket.
- CO risk: Never idle in enclosed spaces; ensure tailpipe is clear of snow/debris.

Sizing & etiquette - Alternators can supply tens of amps, but accessory sockets are usually limited to ~10–15 A; inverters can trip fuses. Prefer direct 12 V USB-C PD adapters when possible. - Keep loads modest while idling; a running vehicle is not a generator substitute.

37.3 Solar Panel Regulators

Solar for steady daytime charging.

- Regulators: PWM (simple/cheap) vs MPPT (more efficient, esp. in cold/low light).
- Sizing: Panel watts device draws with buffer; angle to sun; avoid shading.
- Cabling: Use proper gauge; minimize voltage drop; weatherproof connections.

Power bank strategy - Charge banks first, then devices from banks; avoids tying devices to panels that fluctuate under clouds. - Track bank capacity in watt-hours; plan for at least one full device cycle per critical device.

37.4 Generator Safety (CO)

Place outdoors, downwind, far from openings; use CO detectors indoors. Store fuel safely (approved cans), stabilize gas, and cool before refueling.

Load management - Prioritize cold chain (fridge/freezer) and critical medical devices; cycle loads to keep average power low. - Extension cords: Heavy-gauge outdoor cords; fully uncoil to avoid heat; keep connections off wet ground.

Backfeed warning - Do not backfeed a home via dryer outlets or improvised cords; it endangers line workers and can start fires. Use a transfer switch installed by a professional.

Checklist — Charging Plan - Prioritize critical devices; schedule charge windows - Vehicle: clear tailpipe; outside only; correct adapters - Solar: panel + regulator matched; avoid shade; track sun - Generator: outdoors; CO detector; safe fueling - Banks: charge banks first; know Wh; assign device priority

Examples - Post-storm: Vehicle charges phones with engine running outside; solar panel tops power bank by day; generator runs fridge 1–2 h per 4–6 h with CO alarms active. - Trail basecamp: 60–100 W folding panel to MPPT controller; charges power banks/radios noon to afternoon.

Narrative — A Quiet Power Day Morning sun warmed the folding panel on the picnic table. You clipped the MPPT controller to a 20,000 mAh bank and watched the watts settle as a cloud passed. By noon the bank was full; phones topped off from it while the panel stayed busy. The generator didn't fire all day—no fumes, no noise—because the fridge stayed cold enough with the prior night's cycle.

37.5 Common Mistakes

- Running generators in garages, near doors, or under windows; lethal CO accumulates.
- Backfeeding homes without transfer switches; endangers line workers and can start fires.
- Idling vehicles in snow with buried tailpipes; CO intrusion into cabins.
- Overloading cigarette/accessory sockets with large inverters; blown fuses/melted plugs.
- Coiling extension cords under load; heat build-up and fire risk.
- Plugging sensitive electronics directly into "dirty" generator power without surge/voltage protection.

37.6 Key Takeaways

- Never run engines or generators in enclosed/attached structures—CO kills quietly.
- Solar is quiet and safe; MPPT improves harvest in variable light.
- Prioritize charges; avoid draining critical devices to zero.

37.7 Cross-Links

- Survival Priorities → Rule of 3s (power vs shelter and water tradeoffs): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (re-assess before unsafe charging setups): ../front-matter/03-survival-priorities.html#stop

37.8 Scenario

Scenario (Post-storm mix): Fridge warming, phones low, generator in garage… Decisions: Where to run generator; vehicle charging; solar angle. Outcome: You wheel the generator outdoors downwind, run it in intervals with CO alarms inside, vehicle-charge phones, and top power banks on solar midday. Lessons: CO kills—outside only; staggered charging works Drill: Place your generator's "safe spot" now and mark it.

Chapter 38

Lighting

38.1 Overview

Light enables navigation, work, and signaling. Headlamps keep hands free; handhelds reach farther. Control spill to preserve night vision and reduce signature.

38.2 Headlamps vs Handheld

Headlamps for tasks, handhelds for reach/ID.

- Headlamps: Low modes for close work; red mode for night vision; lockout to prevent pocket turn-on.
- Handhelds: Higher candela for distance ID; use with a clip or lanyard.

38.3 Lumens, Candela, and Beam Shape

Lumens measure total light output; candela measures intensity in a direction (throw). A 1,000-lumen flood may not reach as far as a 300-lumen high-candela thrower.

- Throw vs flood: Search/ID favors candela and tight beams; camp chores favor wide, even floods.
- Runtime honesty: "Turbo" modes often step down. Prefer regulated lights with published runtime graphs.

38.4 Color & Comfort

Color temperature and CRI affect how you see details and read maps.

- Warmer (3,000–4,000 K): Less glare in fog/smoke; more comfortable indoors.
- Neutral/cool (4,500–6,500 K): Perceived brighter; good outdoors.
- High CRI (90): Better color rendering for first aid and map reading; often slightly lower efficiency.

38.5 Beam Control

Aim low; shield spill; use red/low modes. Avoid pointing lights at faces (night blindness) or into traffic.

38.6 Improvised Lanterns

Diffuse a light through a translucent bottle or bag; bounce beams off a white surface/ceiling for wide, soft light.

38.7 Signaling with Light

Use SOS or Rule of Three; high strobe for distance; steady low for task. Avoid blinding rescuers.

38.8 Safety Around Fuels & Traffic

- Flames and fuel: Keep open flames away from gasoline vapors and solvents; use LED lanterns around fuel.
- Traffic: Use amber or red blinkers for road safety; avoid white beams into oncoming lanes; wear reflective/high-viz.

38.9 Narrative — The Living Room Lantern Plan

The house went dark at 19:10. You clipped a headlamp to a clear water jug and set it on the coffee table, a soft globe bright enough for reading without glare. A second, high-candela handheld stayed pocketed for quick checks outside. The kids kept their red modes on during an impromptu board game. When you checked the breaker, you angled your beam down to avoid blinding anyone moving in the hallway.

38.10 Runtime Charts 101 (No Graphs Needed)

Manufacturers publish runtime charts that show how brightness changes over time. Decoding them helps you avoid surprises.

- Regulated vs unregulated: Regulated drivers hold brightness steady, then drop sharply ("cliff"); unregulated lights fade gradually from the start.
- Turbo vs sustainable: Big "turbo" numbers often step down quickly due to heat. Look for medium modes with long, flat runtimes for real work.
- Candela vs lumens at runtime: A light may keep high lumens but lose throw if heat reduces intensity. For distance ID, prioritize sustained candela modes, not just peak lumens.
- Ambient effects: Cold helps cooling (longer high modes); hot, still air shortens them. Headlamps on hats run hotter than on bare heads.

Quick pick heuristic - Tasks at camp: Choose the lowest mode that's comfortable (often 5–40 lm) for hours of runtime. - Navigation: 50–150 lm, bump to higher briefly to check terrain, then back down. - Signaling/search: Short bursts on high; keep a battery reserve and a second light.

Checklist — Light Discipline - Keep lights on low for tasks; red mode for night - Use higher modes for signaling only - Carry spare cells; standardize batteries across devices - Angle beams down; avoid light pollution outside shelter

Examples - Trail at night: Headlamp low; handheld for long checks; red mode in camp. - Urban outage: Lantern made with headlamp + water jug; windows covered to avoid broadcasting.

38.11 Common Mistakes

- Running "turbo" constantly; fast step-downs drain batteries without added utility.
- Blinding partners or responders; aiming beams at faces or traffic.

- Carrying one light and no spare cells; single-point failures in the dark.
- No lockout: accidental activation in pockets/bags drains batteries.
- Mixing old/new cells or chemistries in multi-cell lights; risk of leaks or failure.
- Open flame near fuels; use LED around gasoline/solvents.

38.12 Key Takeaways

- Use the right light for the job; preserve night vision.
- Diffuse for working, strobe for signaling.
- Carry spares and standardize cells.

38.13 Cross-Links

- Survival Priorities → OODA (light checks on a schedule to manage power): ../front-matter/03-survival-priorities.html#ooda

38.14 Scenario

Scenario (Improvised lantern): Kitchen dark; kids nervous. Decisions: Headlamp vs handheld; diffuser setup. Outcome: You strap a headlamp around a water jug for diffuse light and keep one handheld for hallway checks. Lessons: Diffuse for tasks; reserve thrower for checks Drill: Build your favorite diffuser and snap a photo for memory.

Chapter 39

Device Management

39.1 Overview

Treat power like water—allocate by priority, cut waste, and schedule use. Disable radios you don't need; download content for offline use.

39.2 Burn-Down Priorities

List devices by mission impact.

- 1: Life safety/comm (phone, radio, PLB) — keep charged
- 2: Navigation/light — scheduled checks; low modes
- 3: Comfort/info (entertainment) — last priority

39.3 Airplane Mode

Disable cell/Wi-Fi/Bluetooth if not needed; enable GPS only for offline maps; set check intervals.

39.4 Dark Theme/Night Discipline

Dark themes and low brightness preserve night vision and extend battery life. Use screen filters at night.

39.5 Power Math in Plain Terms

- mAh vs Wh: Power banks labeled in mAh assume 3.7 V cells. Usable Wh (mAh × 3.7) ÷ 1000, minus conversion losses (~10–20%).
- Example: A "10,000 mAh" bank 37 Wh; at 5 V out with losses, ~30–33 Wh usable → about one full modern phone charge plus some.

39.6 Cables & Chargers Matter

- Short, quality cables reduce losses and flaky connections; label by device type.
- USB-C PD vs older USB: A PD charger/bank negotiates higher voltages for faster/efficient charge when both sides support it.
- Standardize connectors in your kit where possible; carry one spare.

39.7 Duty Roster for Families/Teams

Designate one device "always-on" for alerts and emergency calls; others stay off and wake on a schedule (e.g., at the top of the hour).

- Rotate the always-on role to spread battery use.
- Log check-in times on paper to avoid waking extra screens.

39.8 Charging Windows

Anchor charging to natural windows: midday solar, generator intervals, or when the vehicle is already running. Don't idle solely to charge if avoidable.

Checklist — Device Plan - Offline maps/files done; notifications off - Power bank at known percent; cables tested - Check intervals set (e.g., nav every 30 minutes) - Brightness down; dark themes enabled - One device "always-on" designated; rotation noted

Examples - Camp: Phones in airplane mode; GPS checks on the hour; headlamps red in camp. - Evac: Family devices prioritized; one device left on for incoming alerts; others off.

Narrative — Two Phones, One Plan Your phone stayed off in a jacket pocket next to the warm power bank. Your partner's phone was the "always-on" alert device. At the top of each hour you powered up, synced messages, sent a quick WHO/WHERE/WHEN/WHAT/INTENT update, marked the time on a sticky note, and went dark again. The bank stayed above one bar because you charged during the sunny window at lunch.

39.9 Key Takeaways

- Prioritize life safety devices; duty-cycle others.
- Airplane mode + offline data saves power.
- Dark themes + low brightness preserve vision and battery.

39.10 Cross-Links

- Survival Priorities → PACE Comms Plan (who carries comms and when): ../front-matter/03-survival-priorities.html#pace-communications-plan

39.11 Scenario

> Scenario (Family power ladder): Outage for two days. Decisions: Which device stays on; who carries the bank; check cadence. Outcome: One phone stays on for alerts, others cycle off; banks rotate; check-ins hourly then 6-hourly overnight. Lessons: Prioritize life-safety devices; schedule the rest Drill: Make a "device priority" sticky for the fridge.

Part X

Part X — Urban & Structural Emergencies

Chapter 40

Shelter-in-Place vs Evacuate

40.1 Overview

Decide early and deliberately whether to stay or go. Shelter-in-place protects from external hazards; evacuation trades exposure risks for reaching safety. Pre-plan triggers and routes.

40.2 Decision Triggers

Match triggers to hazards and your circumstances.

- Shelter-in-place: Air quality/hazmat outside, civil unrest nearby, severe weather without safe route, mobility limits.
- Evacuate: Fire in building, structural damage, rising water, directed by authorities, downstream of dam/burn scar with heavy rain.

40.3 Utility Shut-Off

Know how to safely shut off utilities.

- Gas: Only if you smell gas or suspect a leak; turn valve 90° to off; only a pro should turn back on.
- Electric: Main breaker off before working on circuits; stand to the side; dry hands.
- Water: Close main to protect supply; open low faucet to drain if needed.

40.4 Ventilation & Smoke Control

For poor air, choose an interior room; seal gaps with tape/towels; run HEPA if power exists. For smoke/fire, close doors to limit spread; stay low; feel doors for heat before opening; use wet cloths only as comfort—not protection.

Checklist — Stay or Go - Hazard identified; triggers matched (stay vs go) - Comms: receive official alerts; family PACE plan confirmed - If staying: interior room chosen; sealing materials ready; supplies on hand - If going: go-bag ready; route known (primary/alternate); shut-offs as needed

Examples - Wildfire smoke: SIP in interior room; tape seals; HEPA on; check AQI; leave if evacuation ordered or smoke intrudes. - Apartment fire alarm: Feel door; if cool, exit via stairs with keys/ID; if hot/smoky, stay inside, seal, signal from window.

40.5 Key Takeaways

- Decide early; SIP for outside air hazards, evacuate for internal fire/structural threats.
- Know shut-off procedures; never re-light gas yourself.
- Keep a go-bag and a room-sealing kit ready.

40.6 Cross-Links

- Survival Priorities → Rule of 3s (air/thermal considerations drive decision): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (avoid panic, choose deliberately): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → PACE Comms Plan (alerts, rendezvous, check-ins): ../front-matter/03-survival-priorities.html#pace-communications-plan

40.7 Scenarios

Scenario (Apartment smoke in hall): Alarm sounds; door feels cool. Decisions: SIP vs stairs; materials to seal; keys. Outcome: You gather keys, phone, go-bag; crack door cautiously; stairwell is clear; you evacuate. If smoke, you'd seal and signal. Lessons: Door control + pre-staged kit Drill: Time your grab-and-go to the stair door.

Chapter 41

Specific Incidents

41.1 Overview

Incidents differ, but patterns repeat: protect airway and breathing, control heat loss/gain, avoid obvious hazards, and communicate. Use these quick guides, then adapt locally.

41.2 Earthquake

During shaking - Drop, Cover, Hold On: Get under a sturdy table/desk or beside an interior wall; cover head/neck; hold until shaking stops. - Stay put: Indoors → stay indoors; outdoors → move to open area away from buildings, glass, power lines. - In bed: Stay in bed, cover head with pillow; don't run barefoot over glass. - In a vehicle: Pull over clear of bridges, overpasses, trees, and wires; stop with brake applied; stay inside until shaking stops.

After shaking - Check for injuries first; control bleeding; treat life threats. - Fire/gas/electric: If you smell gas or hear hissing, don't use switches; open door/window if safe and evacuate; shut gas off only if you suspect a leak (pro must turn it back on). - Evacuate via stairs; avoid elevators; expect aftershocks; keep shoes on; avoid glass façades.

Common mistakes - Running outside during shaking; standing in doorways in modern buildings (not safer). - Turning gas back on yourself; re-entering damaged structures before inspection.

41.3 Hurricane

Before - Track forecasts and local orders; know your evacuation zone; leave early if advised. - Protect: Install shutters/plywood; bring in outdoor items; clear gutters/drains; trim weak branches. - Prep: Water (at least 3–4 L/person/day), shelf-stable food, meds, documents, cash; charge devices; fill fuel; freeze water bottles to extend fridge. - Generator: Run outside only; 6+ m (20 ft) from doors/windows; CO alarm working.

During - Shelter in an interior room or hallway away from windows; wear shoes; keep helmets for kids. - Avoid flood rooms; do not enter standing water; unplug non-essential devices; monitor official alerts.

After - Beware downed lines, gas leaks, and unstable trees/structures; use gloves and eye protection. - Avoid floodwater (contaminants, sharp debris); heed boil-water advisories; document damage safely.

41.4 Tornado

During - Move to the lowest interior room/basement; small center rooms, under sturdy furniture; cover head/neck (helmets/blankets). - Mobile homes, vehicles, outdoors: Move to sturdy shelter immediately; do

not shelter under overpasses.

If caught outside with no shelter - Lie flat in a low spot only as a last resort; protect head/neck; watch for flash flooding.

After - Treat injuries; check for gas leaks; avoid damaged power lines and debris fields.

41.5 Flood

Avoidance - Turn around, don't drown: 15–30 cm (6–12 in) of moving water can knock you off your feet; ~0.6 m (2 ft) floats most vehicles. - Know low spots/underpasses on your routes; pre-plan higher alternates.

If water rises - Move to higher ground/floors; avoid basements. - On foot: Use a stick to probe depth; avoid manholes/drains; avoid fast flows. - In vehicle: Reverse out early; if trapped, see Vehicle & Flood Interactions.

After - Assume contamination (fuel/sewage); avoid contact; discard food/water exposed to floodwater; shut power off only if safe/dry.

41.6 Wildfire

Before - Create defensible space (clear brush/combustibles); have go-bags, N95/KN95 masks, eye protection; vehicle fueled, nose-out. - Pre-set triggers for leaving (e.g., plume and wind direction, evacuation zone status) and go early.

During - If ordered or you feel unsafe, leave early; drive with lights on; windows up; A/C on recirculate; watch for embers and low visibility. - If trapped: Shelter in a cleared area; as last resort stay in vehicle with engine off, doors closed, below window line; cover skin; move only when survivable.

After - Watch for hotspots, weakened trees, and falling ash; check air quality; wear masks while cleaning.

41.7 Winter Storms

Before - Weatherize home (insulate, cover outdoor spigots); stage safe heat sources; stock water/food; check CO/smoke alarms; check neighbors. - Vehicle: Winter tires, chains where legal, car kit (blanket, shovel, traction aids, sand, water, snacks). Keep tank 1/2.

During - Stay inside; layer clothing; use safe heat only; ventilate fuel heaters; never run grills indoors. - In vehicle: Park safely; clear tailpipe; run engine 10–15 min each hour for heat; crack a downwind window; conserve fuel.

After - Beware ice fall and hypothermia; shovel carefully (spine/heart risk); rest often; hydrate.

41.8 Heatwaves

Risk management - Hydrate with electrolytes; schedule activity early/late; use cooling centers; check on vulnerable people (elderly, infants, workers). - Shade windows; use fans to exhaust hot air at night and draw in cooler air; avoid alcohol; wear light, loose clothing.

Emergencies - Heat exhaustion: Cool in shade, fluids, rest; remove excess clothing; cool mist and fan. - Heat stroke (emergency): Altered mental status or collapse—call EMS; cool aggressively (cold water immersion if possible, or douse water + fan); place ice packs at neck/groin/armpits.

41.9 Hazmat/Air Quality Events

Shelter-in-place (airborne particulates/irritants) - Choose an interior room; close/lock windows/doors; turn off HVAC; seal gaps with tape/towels; run HEPA if available. - N95/KN95 helps for particulates (smoke/dust); they do not protect against gases (e.g., chlorine, ammonia).

Chemical releases - If you see/smell a chemical cloud, move perpendicular to wind to exit plume; follow official directions promptly. - Decon basics: Remove outer clothing; bag it; shower with soap and water (not harsh chemicals); avoid spreading contaminant.

41.10 Elevators & Stairwells

Elevators - If entrapped: Use alarm/phone; call emergency services; stay inside car unless explicitly directed by responders; falls happen when people try to self-rescue. - During fire/outage: Do not use; take stairs.

Stairwells - Use handrails; keep right; avoid bottlenecks; watch smoke—choose a clear stair if possible; close doors behind you to slow smoke.

41.11 Crowd Crush Avoidance

Prevention - Identify exits on arrival; stay on edges; avoid rigid barriers; monitor density (>4–5 people/m^2 is dangerous).

If density rises - Angle diagonally with the flow toward edges; keep arms up in a box around chest to protect breathing space; communicate calmly.

If knocked down - Curl to protect head/neck; get to knees then feet at first chance; move toward edge; help others up when safe.

41.12 Glass & Facade Hazards

Avoid zones beneath glass curtain walls and façades during wind/seismic events; heed cordons; choose interior corridors; wear sturdy shoes.

Post-incident - Beware falling glass, spalled concrete, and unsecured signage; don't linger under cranes/scaffolding; follow building safety notices.

Checklist — Urban Incident Basics - Know two exits per building/venue - Carry light, whistle, and small first aid on person - Keep phone charged and offline maps stored - Agree on family rendezvous and PACE comms - Respect cordons; avoid glass zones and flood underpasses

Examples - Flash flood warning: Cancel drive through low-lying shortcut; use higher route; delay if necessary. - Post-quake: Evacuate via stairs; check gas smell; bring go-bag; text check-in at rendezvous.

41.13 Key Takeaways

- Pre-plan exits and rendezvous; leave early when hazards grow.
- SIP for air hazards; evacuate for fire/structural threats.
- Avoid water crossings and glass zones; keep comms and light on person.
- For floods/wildfire/tornado, triggers and early action save lives.

41.14 Cross-Links

- Survival Priorities → Rule of 3s (air/shelter decisions): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (reset, then act deliberately): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → PACE Comms Plan (alerts, rendezvous): ../front-matter/03-survival-priorities.html#pace-communications-plan

41.15 Scenarios

Scenario (Flash flood reroute): Underpass pooled with fast water. Decisions: Push through vs turn around; alt route time. Outcome: You turn, take a higher parallel street, and arrive late but safe. Lessons: "Turn around, don't drown" saves lives Drill: Identify three low spots on your commute and alternates.

Scenario (Quake aftershock): Stairs or shelter in place? Decisions: Wait for shaking to stop; check for hazards; exit path. Outcome: You wait, grab go-bag, avoid glass curtain wall, and descend via stairs to the rally point. Lessons: Two exits known in advance beat panic Drill: Walk two exits for home/work/school.

Scenario (Wildfire smoke day): AQI spikes; distant plume shifts toward town. Decisions: Leave now vs monitor; mask; route selection. Outcome: You don N95s, shut HVAC, load go-bags, and depart on the upwind alternate before routes clog. Lessons: Pre-set triggers + early departure prevent being trapped Drill: Pick two wildfire evacuation triggers for your area.

Chapter 42

Fire Behavior Basics

42.1 Overview

Fire grows with fuel, heat, and oxygen. Control doors and ventilation to starve fire of oxygen and heat flow. Smoke kills—stay low, move fast, and have a plan.

42.2 Flow Path Awareness

Openings create paths for hot gases and smoke.

- Closing doors slows fire spread; isolates smoke/heat.
- Opening windows/doors feeds fire and can draw flames—only ventilate to escape.

42.3 Door Control

Feel door with back of hand; if hot, do not open. If cool, open slowly, staying behind the door; close doors behind you during egress.

42.4 Stay-Low Movement

Crawl or stay low; smoke rises. Keep one hand on wall; count doors in smoke; follow landmarks.

42.5 Egress Planning

Know two exits from every room; practice family escape; keep keys near egress; don't block exits with storage.

Checklist — Home Fire Prep - Smoke/CO alarms tested monthly; batteries fresh - Extinguishers accessible; know PASS (Pull, Aim, Squeeze, Sweep) - Two exits per room; meeting point outside - Close doors at night; clear egress paths

Examples - Kitchen fire: Lid on pan; turn off heat; don't move flaming pan; small extinguisher if safe; evacuate if out of control. - Apartment smoke in hall: Close your door; seal gaps; call for help; signal at window; evacuate only if safe.

42.6 Key Takeaways

- Control doors and vents; smoke/heat flow follows openings.
- Staying low and closing doors saves lives.
- Practice escape routes; alarms and extinguishers ready.

42.7 Cross-Links

- Survival Priorities → Rule of 3s (air first): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (avoid panic, act in order): ../front-matter/03-survival-priorities.html#stop

42.8 Scenario

Scenario (Closed-door survivability): Night fire on another floor. Decisions: Door closed vs open; stay or go; window signal. Outcome: You keep the door closed, seal gaps, signal at the window, and survive until firefighters arrive. Lessons: Close before you doze; door control saves lives Drill: Close bedroom doors nightly.

Chapter 43

Vehicle & Flood Interactions

43.1 Overview

Water hides hazards and multiplies force. Avoid entering flood water on foot or in vehicles. Escape from entrapped vehicles requires speed and a plan.

43.2 Avoiding Water Crossings

Assess depth, speed, and substrate.

- Do not drive through moving water; roadbeds may be washed out.
- Depth: 15–30 cm (6–12 in) can float small cars; 0.6 m (2 ft) can float most vehicles.
- Speed: Fast flows sweep feet/vehicles; seek alternate routes.

43.3 Swiftwater Hazards

Cold shock, debris impact, foot entrapment, and strainers (trees/fences). Do not attempt rope rescues without training; call professionals.

43.4 Vehicle Float/Entrapment Realities

If water rises around a vehicle:

- Unbuckle; children out of seats first; unlock doors; windows down immediately if power works.
- If power fails: Break side windows (not windshield) with a dedicated tool aimed at corners; kick if needed.
- Exit and move to higher ground; don't waste time on belongings.

Narrative — Seconds Count Rain hammered so hard the wipers smeared. The underpass ahead looked shallow—until a truck's wake slapped your bumper. You stopped before the deepest pool, shifted to reverse, and felt the tires lose bite. The door locks clicked. You unbuckled, hit all four window switches. Two slid; two stuttered. You shoved a glass-break tool into the rear side window corner and popped it with a sharp push. Kids out first—one by one through the opening—then you. Wallet and phone stayed behind. On the sidewalk, you watched taillights disappear under the brown water you didn't enter.

Checklist — Flood Safety - Avoid water crossings; turn around - Know low-water/flood-prone routes and avoid in storms - Carry glass-break/seatbelt cutter tool within reach - If trapped: unbuckle → windows → out → up

Examples - Urban flash flood: Turn onto higher parallel street; avoid underpasses; delay arrival. - Low water crossing after storm: Depth unknown; road possibly undermined; wait or reroute.

43.5 Key Takeaways

- Don't drive/walk through flood waters; roads may not exist under the surface.
- If entrapped, act quickly: seatbelts, windows, exit, higher ground.

43.6 Cross-Links

- Survival Priorities → Rule of 3s (air/thermal over schedule): ../front-matter/03-survival-priorities.html#rule-of-3s
- Survival Priorities → STOP (avoid impulsive crossings): ../front-matter/03-survival-priorities.html#stop

43.7 Scenario

Scenario (Underpass fills fast): Rain bursts; water rises around cars. Decisions: Proceed vs back out; alternate route. Outcome: You reverse out early and reroute; later you learn cars were stranded. Lessons: Early retreat beats getting stuck Drill: Save an alt route in your map app.

Chapter 44

Pets, Kids & Dependent Care

44.1 Overview

Evacuations succeed when dependents' needs are pre-planned. Keep essential care items ready, transport safely, and document needs clearly.

44.2 Car Seats During Evacuation

Use correct seat type and installation.

- Keep seats installed and ready; practice rapid transfer between vehicles.
- Use lower anchors or seat belts per manual; check harness chest clip at armpit level.

44.3 Pet Carriers

Sized for animal to stand/turn/lie. Label with name/owner/contact; include leash, muzzle (if needed), water, and pad.

44.4 Medications

Maintain 7–14 day supply if possible; rotate. Keep printed list: names, doses, schedules, prescribers, allergies. Store backups in go-bag.

44.5 Documentation

IDs for kids/pets; copies of medical cards, vaccination records, and care instructions; emergency contacts; consent for caregivers.

Checklist — Dependent Evac Ready - Car seats staged; practice installation - Pet carrier with ID, leash, water; plan for hotels/shelters that accept pets - Meds list + labeled weekly sorter; refills tracked - Copies of IDs, insurance, contacts; caregiver consent forms

Examples - Wildfire evac: Kids buckled with go-bags; pet carriers pre-loaded; meds and documents folder grabbed; rendezvous confirmed. - Flood sheltering: Hotel pre-screened for pets; spare litter and food packed; medications with cold-pack.

44.6 Key Takeaways

- Pre-stage car seats and pet carriers; practice transfers.
- Maintain medication lists and small reserves; keep documents handy.
- Confirm shelters/hotels for pets; have caregiver consents ready.

44.7 Cross-Links

- Survival Priorities → PACE Comms Plan (family rendezvous, check-ins): ../front-matter/03-survival-priorities.html#pace-communications-plan

44.8 Scenario

Scenario (Wildfire evac with pets): Ash drifts; advisory issued. Decisions: Pack now vs wait; hotel that takes pets; meds. Outcome: You load car seats, pet carriers, meds folder, and go-bags; you depart on the primary route before congestion. Lessons: Pet-friendly plans + meds docs = smoother evac Drill: Call two pet-friendly hotels today and note policy.

Part XI

Part XI — Security, De-Escalation & Group Operations

Chapter 45

Personal Security

45.1 Overview

Most security problems are avoided with posture, choices, and distance. Set boundaries early, use your voice, and leave when things feel off. Your goal is to get home safe, not to win arguments.

45.2 Avoidance

Choose routes and behaviors that reduce exposure.

- Well-lit routes; avoid predictable routines; travel with others when possible.
- Keep valuables out of sight; minimize phone use while walking.

45.3 Boundary Setting

Use clear, firm statements and maintain distance. “Stop. I don’t want any trouble. I’m leaving.”

45.4 Verbal De-Escalation

Calm voice; non-confrontational language; acknowledge feelings without agreeing; offer exits. Avoid insults or threats.

45.5 Travel Posture

Confident walk; shoulders down; scan 120°; remove earbud in one ear; keys accessible; bag cross-body.

45.6 Noise/Light/Odor Discipline

At night or in shared spaces, reduce signatures to avoid attention.

45.7 Common Street Scams & Pretexts

- “Got a light/pen?”: Respectfully decline, maintain distance, keep moving.
- “Can you help carry this?”: Decline if alone; offer to call assistance instead.
- “Uniform” without ID: Ask for ID; keep distance; verify via official phone numbers.

45.8 Vehicle Entry/Exit Safety

- Approach with keys ready; scan around/under vehicle; unlock once, get in, lock immediately.
- Park nose-out where possible; choose lit areas; avoid being boxed in.
- If bumped lightly from behind in a suspicious area/time, consider driving to a lit, populated place before stopping.

45.9 If You're Followed

- Change pace/route; cross the street; enter a busy, well-lit store or transit hub; ask staff for help.
- Call a trusted contact on speaker; share live location; describe the person/vehicle.

45.10 Tech Aids

- Set emergency SOS/shortcut on your phone; pre-configure emergency contacts.
- Share ETA and live location when walking alone; use a code word with family for "pick me up now."

Checklist — Street Smarts - Route chosen for light/people/visibility - Phone away; earbuds low/one ear - Boundaries rehearsed; exit options known - Keep distance; cross street early if needed

Examples — Boundary Scripts - "Stop. I don't want any trouble. I'm leaving." - "I can't help you. Please give me space." - "I'm not interested. Have a good night."

Examples - Late train stop: Choose busier exit; walk near edges of groups; keep 2–3 m from others; call check-in when safe. - Unwanted approach: Verbal boundary; change direction to well-lit store; call a friend on speaker.

45.11 Key Takeaways

- Avoidance and early boundary setting prevent escalation.
- Project calm confidence; manage distance and exits.
- Reduce signatures when discretion is safer.

45.12 Cross-Links

- Survival Priorities → STOP (reset fear, choose actions): ../front-matter/03-survival-priorities.html#stop
- Survival Priorities → PACE Comms Plan (check-ins, code words): ../front-matter/03-survival-priorities.html#pace-communications-plan

45.13 Scenario

Scenario (Boundary at bus stop): Someone closes distance, asks for money aggressively. Decisions: Verbal boundary; move; call; crowd proximity. Outcome: You put up a hand, say "Stop. I don't want trouble. I'm leaving," cross to a lit store, and phone a friend. Lessons: Clear boundary + movement + witnesses Drill: Practice your boundary phrase aloud, calmly.

Chapter 46

Group Dynamics & Leadership

46.1 Overview

Small groups succeed with clarity, cadence, and care. Define roles, keep comms short and closed-loop, and protect rest and morale.

46.2 Roles

Assign who does what.

- Leader (can rotate): decides and coordinates
- Navigator: route/time checks
- Medic: first aid kit, status checks
- Comms: radio/phone, logs

46.3 Check-Ins

Schedule brief check-ins (e.g., every 30–60 min or at landmarks). Confirm location, status, and intent.

46.4 Span of Control

Keep sub-groups small (3–5 per lead) to avoid overload; use buddy pairs.

46.5 Morale & Rest Cycles

Rotate heavy tasks; enforce short rests/snacks/water; check for cold/heat stress.

46.6 Briefs & Debriefs

Brief: Purpose, key tasks, end state, hazards, comms. Debrief: What went well, what to change, actions.

46.7 Logs & Task Boards

Whiteboard/notebook for tasks, owners, status. Timestamp decisions.

46.8 Decision-Making & Comms Patterns

- Closed-loop: Sender states task; receiver repeats back; sender confirms. Avoid "copy?" without read-back.
- 1-3-1: Present 1 situation, 3 options, 1 recommendation to speed decisions.
- Brief format (lightweight SMEAC): Situation → Mission → Execution (who/what/when) → Admin/Log → Comms.

46.9 Conflict & De-Escalation Inside Teams

- Name tensions early; use short, neutral language: "Let's pause. We have two views. We'll pick one in 60 seconds."
- Separate people from problem; assign a timebox; pick a plan and move; debrief later.
- Default to safety/energy preservation when in doubt; avoid ego or sunk-cost fights under fatigue.

46.10 Hand Signals (Noisy/Low-Light)

- Stop: Raised fist.
- Gather: Arm up, slow circle.
- Move/Advance: Flat hand forward, push motion.
- Slow/Quiet: Palm down, patting motion.
- Point: Two taps on chest, then point to your destination/interest.

Checklist — Group Cadence - Roles assigned; buddy pairs in place - Check-ins scheduled; closed-loop comms enforced - Rest/food/water cycles set; morale monitored - Brief → execute → debrief loop active

Examples — Comms Scripts - Tasking: "Alex, take Sam. Clear the east trail to the bend. Report back in 10 minutes." - Read-back: "Copy: Sam and I clear east trail to bend, back in 10." - Turnaround: "Weather closing. Turn at 14:30 no matter where we are."

Examples - Trail team: Navigator calls 30-min checks; Comms logs times/locations; Medic runs warmth checks; Leader sets turnaround time. - Neighborhood cleanup: Task board with assignments; radio check at top-of-hour; 10-minute rests every hour.

46.11 Key Takeaways

- Clear roles and simple cadence prevent confusion.
- Closed-loop comms and short check-ins keep teams aligned.
- Rest cycles and morale checks prevent quiet failures.

46.12 Cross-Links

- Survival Priorities → OODA (loop decisions and checks): ../front-matter/03-survival-priorities.html#ooda
- Survival Priorities → PACE Comms Plan (roles, check-ins, rendezvous): ../front-matter/03-survival-priorities.html#pace-communications-plan

46.13 Scenario

Scenario (Trail team cadence): Four hikers, changing weather. Decisions: Who leads; check-in schedule; turnaround time. Outcome: You assign roles, run 30-minute checks, and turn at the

planned time, beating the storm. Lessons: Roles + cadence prevent quiet failures Drill: Run a 15-minute “brief → execute → debrief” on a small task today.

Chapter 47

Community Coordination

47.1 Overview

Neighbors are your fastest mutual aid network. Simple structures (check-ins, roles, radios) turn chaos into coordinated help. Keep it light; build trust.

47.2 Neighborhood Check-Ins

Block captains; door-to-door checks for vulnerable residents; share status boards.

47.3 CERT Concepts

CERT trains volunteers in light search/rescue, triage, and fire suppression. Consider training and exercises.

47.4 ICS Basics (Roles, Comms)

ICS provides a common structure: Incident Commander, Operations, Planning, Logistics, Finance/Admin. Use scaled-down versions for community efforts.

47.5 Mutual Aid Etiquette

Offer within capacity; accept help graciously; communicate limits; document tasks and hazards; don't self-deploy into other neighborhoods without invitation/coordination.

47.6 Information Hygiene

Verify before sharing; cite sources; avoid amplifying rumors; monitor official channels; correct mistakes publicly.

47.7 Neighborhood Ops Center (Lightweight)

Pick a predictable spot (lobby, cul-de-sac, community room) to post updates and run quick briefs.

- Board: Whiteboard or door sheet with columns: Time, Situation, Tasks, Owners, Status, Needs.
- Signage: Simple arrows to the board; multilingual if needed; clear quiet hours.

- Safety: First-aid kit, extinguisher, PPE; keep aisles clear; post emergency numbers.
- Brief cadence: Top-of-hour 5-minute huddles. One lead, timeboxed decisions.

47.8 Door Tags & Wellness Checks

Fast visual triage of households without intruding.

- Door tags: Slip simple cards or tape paper: “OK” (no urgent needs) / “HELP” (urgent). Add optional notes (pets, meds).
- Knock script: “Hi, I’m Pat from next door. We’re doing quick checks. Is anyone hurt? Do you need anything urgent?”
- Record: Mark the status board with addresses, time, and any follow-ups.

47.9 Radio Net & Message Flow (ICS-Lite)

Run a neighborhood net at set times on a known channel (see PACE plan).

- Net control script: “Neighborhood Net, this is Net Control on FRS 2, time 1800. Check in with address, status, and needs. Over.”
- Check-in format: “123 Oak: OK, two adults, one child, no needs; have chainsaw; next check 2000.”
- Message form (short ICS-213): TO, FROM, TIME, MESSAGE, ACTION TAKEN. Snap a photo and post to the board after read-back.

47.10 Resource Pods

Stage tools and supplies where they’re needed and tracked.

- Pods: Saw + fuel + PPE; tarp + ties + poles; water filter + containers; shovel + salt/sand.
- Sign-out: Who took what, when, return time; avoids duplication and loss; improves accountability.

47.11 Privacy & Dignity

Share only what’s needed to coordinate tasks. Avoid posting medical details publicly; use “contact Pat in 2B” instead of sensitive notes.

Checklist — Block Readiness - Contact list; roles; check-in schedule - Simple channel plan (FRS/GMRS) and message board - Map of residents, skills, resources, vulnerabilities - Drill quarterly; after-action notes

Examples — Narrative The lobby became your ops center. A handwritten sign pointed to a table with a whiteboard: Time, Situation, Tasks, Owners, Status. At 18:00, you ran a five-minute brief. “Tree down on Maple, power likely overnight. We’ll check on oxygen users, post ‘OK/HELP’ door tags, and set a radio net at 20:00.” By 18:30, a quiet knock routine covered the third floor. Most doors showed “OK”; one “HELP” note led to a battery bank delivery for a CPAP. Tools lived in labeled tubs—saws with chaps and eye pro in one, tarps and line in another. A simple sign-out sheet stopped the fourth duplicate broom run.

Examples - Storm prep: Text tree confirm; radios on Ch 2 at top-of-hour; collect needs/offerings list; assign snow/branch clearing teams. - Outage: Share extension cord etiquette; warming/cooling centers list; check on oxygen-dependent neighbors.

47.12 Key Takeaways

- Light structure beats chaos; keep it simple and humane.
- Train with CERT if available; borrow ICS concepts as needed.

- Verify information; share only what you'd stake your name on.

47.13 Cross-Links

- Survival Priorities → PACE Comms Plan (community channel/time standards): ../front-matter/03-survival-priorities.html#pace-communications-plan
- Survival Priorities → OODA (brief → execute → debrief cycles): ../front-matter/03-survival-priorities.html#ooda

47.14 Cross-Links

- Survival Priorities → PACE Comms Plan (community channel/time standards): ../front-matter/03-survival-priorities.html#pace-communications-plan

47.15 Scenario

Scenario (Text tree in outage): Power out; rumors fly. Decisions: Which info to share; channel/time; roles. Outcome: You run hourly check-ins on FRS Ch 2, post a simple board in the lobby, and squash a false evacuation rumor. Lessons: ICS-lite + verification prevents chaos Drill: Make a one-page block plan with channels/times.

Part XII

Part XII — Planning, Logistics & Practice

Chapter 48

Family/Team Emergency Plan

48.1 Overview

Write it down, share it, and practice. A simple plan beats wishful thinking. Use PACE for both comms and meeting points; print copies for wallets and post on the fridge.

48.2 Rendezvous Points

Choose Primary and Alternates; add maps/directions.

- HOME, NEAR (e.g., neighbor), FAR (out-of-area). Note parking, access, and best routes by hazard.

48.3 Out-of-Area Contact

Select a reliable person outside the local area. Everyone texts/calls them with WHO/WHERE/WHEN/WHAT/INTENT if local comms fail.

48.4 Comms Ladders (PACE)

Primary (voice), Alternate (SMS/app), Contingency (FRS/GMRS schedule), Emergency (meet at FAR by time). Write exact channels/times.

48.5 Evacuation Routes

Two+ routes for common hazards (fire, flood, quake). Note choke points, low water crossings, and fuel stops.

48.6 Shelter Options

List options in/out of area; include pet policies. Keep emergency cash for deposits.

48.7 Rally Timelines

Set check-in times by hazard; define “if no contact by X, go to Y by Z time.”

Checklist — One-Page Family Plan - Contacts: out-of-area and local; school/work numbers - PACE comms with times/channels - Rendezvous: HOME/NEAR/FAR addresses and maps - Evac routes with alternates and fuel notes - Special needs: meds, equipment, pets

Examples - Wildfire: If AQI>200 or evac advisory issued, load car; if evac order or fire within 5 mi, depart via Route A; check in every 60 min; meet at FAR by 18:00 if comms fail. - Quake: Family texts out-of-area contact; if home unsafe, NEAR meet; if not safe by 2 h, FAR meet.

48.8 Key Takeaways

- Write, share, and drill the plan; update after real events.
- Pick clear rendezvous and comms schedules; avoid "we'll figure it out."
- Include pets/meds; carry printed copies.

48.9 Cross-Links

- Survival Priorities → PACE Comms Plan (operational details): ../front-matter/03-survival-priorities.html#pace-communications-plan

48.10 Scenario

Scenario (Hurricane advisory): 36 hours out. Decisions: Stay vs go; FAR rendezvous; comms windows. Outcome: You decide to leave 24 hours before landfall, text the out-of-area contact the plan, and meet at FAR if comms fail. Lessons: Early, written plans beat last-minute debates Drill: Print the one-page plan and put it on the fridge.

Chapter 49

Documentation & Finances

49.1 Overview

Paperwork is a lifesaving tool in bureaucratic emergencies. Keep redundant copies, protect privacy, and organize for quick departure.

49.2 ID

Government IDs, passports, birth certificates; copies stored encrypted in cloud + printed in grab folder.

49.3 Medication Lists

Up-to-date list with names, doses, schedules, prescribers, pharmacy, allergies, and conditions. Keep in wallet and go-bag.

49.4 Insurance

Home, auto, health; policy numbers, agent contacts; photos of cards; claims steps checklist.

49.5 Photos of Valuables

Room-by-room photos/videos; serial numbers; receipts; store off-site; update yearly.

49.6 Cash (Small Bills)

$100–$400 in small bills ($1–$20); split across kits/home safe; rotate occasionally.

49.7 Cloud + Physical Redundancy

Use encrypted cloud storage with strong passwords + MFA; keep an offline USB copy in a fire-safe or with a trusted contact.

49.8 Grab-and-Go Folders

One clearly labeled folder with copies of IDs, insurance, contacts, medical lists, pet records, deeds/titles; place near exit.

Checklist — Paper & Money - IDs and critical documents copied and backed up - Insurance policies and agent contacts handy - Photo inventory completed/updated - Cash small bills staged - Encrypted cloud + offline backup

Examples - Pre-season prep: Update photos; test restore from cloud; rotate cash; refresh contact sheet. - Evac drill: Grab folder + go-bags; verify all needed docs present.

49.9 Key Takeaways

- Redundancy + encryption protect your identity and enable faster recovery.
- Keep small cash reserves for no-power transactions.
- A single grab folder saves minutes under stress.

49.10 Scenario

Scenario (Grab-folder win): Tree falls on roof; you need a hotel and to start a claim. Decisions: Which docs to bring; where copies live; cash for deposits. Outcome: You grab the folder, pay with small bills while ATMs are down, and file a claim the same day. Lessons: Copies + cash accelerate recovery Drill: Do a 10-minute “grab-folder audit” tonight.

Chapter 50

Maintenance & Drills

50.1 Overview

Preparedness is a habit. Short, regular checks keep kits current and skills sharp. Drills turn plans into muscle memory and reveal gaps.

50.2 Kit Checks (Monthly/Quarterly)

Calendar recurring checks; tie to seasons.

- Batteries: Replace/charge/rotate; test lights and radios.
- Expirations: Medications, water treatment, food, fire starters.
- Wear/fit: Clothing, boots, gloves sized and intact.
- Documents: Update contact lists and copies.

50.3 Seasonal Refresh

Swap insulation, sun/bug protection, vehicle fluids (washer), and hazards (chains vs heat kit).

50.4 Scenario Practice

Run bite-size drills: blackout evening, smoke SIP, fire egress, get-home walk, water boil and filter, first aid scenarios. Time them; take notes.

50.5 Skill Trees

List core skills with next steps (e.g., CPR → Stop the Bleed → Wilderness First Aid). Track progress.

50.6 Training Logs

Simple log with date, skill, what went well, what to change, gear notes.

50.7 After-Action Reviews

Immediately after drills/events: what happened, what went well, what to improve, who owns fixes, by when.

Checklist — Monthly 30-Minute Sprint - Test lights, radios, and battery banks - Check go-bags (food/water/meds/clothes) - Update docs; review PACE cards - Drill one micro-scenario (e.g., fire egress)

Examples - Home blackout drill: Kill main breaker for 30 minutes; light plan works? Fridge temps? Comms? Notes for improvement. - Get-home drill: Walk 5 km route with GHB; adjust weight; note time and water.

50.8 Key Takeaways

- Small, regular checks prevent quiet kit failures.
- Drills reveal gaps; capture fixes with owners and dates.
- Tie maintenance to seasons and calendars so it actually happens.

50.9 Scenario

Scenario (30-minute blackout drill): You flip the main breaker at 20:00. Decisions: Light plan; fridge times; comms; AAR notes. Outcome: You discover two dead batteries, fix placements, and add a fridge thermometer; notes assigned to owners with dates. Lessons: Small drills reveal cheap fixes Drill: Put a monthly 30-minute sprint on the calendar.

Part XIII

Appendices

Appendix A

At-a-Glance Cards

A.1 MARCH-E

Massive bleeding → Airway → Respiration → Circulation → Hypothermia/Head → Everything else

- Massive bleeding: Direct pressure → hemostatic packing → tourniquet (note time)
- Airway: Head-tilt chin-lift or jaw thrust; position of comfort
- Respiration: Expose; seal open chest wounds; sit up if easier to breathe
- Circulation: Pulse/skin; manage shock; elevate legs if no trauma
- Hypothermia/Head: Insulate from ground; wrap; monitor AVPU
- Everything else: Secondary survey; meds/IDs; vitals every 5–15 min

A.2 Hypothermia/Hyperthermia

Hypothermia - Signs: Shivering → slurred speech → drowsy → shivering stops (worse) - Actions: Dry layers, wind/water block, warm sweet drinks if alert, heat packs to armpits/groin/neck; handle gently

Hyperthermia - Signs: Cramps → exhaustion (sweaty, weak) → stroke (altered, very hot) - Actions: Shade, water/ORS, cool with water and fanning; ice to neck/groin/armpits; call EMS for stroke signs

A.3 Dehydration ORS Recipe

1 L safe water + 6 level tsp sugar + 1/2 level tsp salt; stir until dissolved; taste lightly salty.

Sip steadily; if vomiting, 5–10 mL every 2–3 minutes.

Print, cut, and laminate for kits.

Appendix B

Signal Library

B.1 Morse Code

Letters - A · — - B — · · · - C — · — · - D — · · - E · - F · · — · - G — — · - H · · · · - I · · - J · — — — - K — · — - L · — · · - M — — - N — · - O — — — - P · — — · - Q — — · — - R · — · - S · · · - T — - U · · — - V · · · — - W · — — - X — · · — - Y — · — — - Z — — · ·

Numbers - 1 · — — — — - 2 · · — — — - 3 · · · — — - 4 · · · · — - 5 · · · · · - 6 — · · · · - 7 — — · · · - 8 — — — · · - 9 — — — — · - 0 — — — — —

B.2 Whistle Patterns

Standard (agree with group) - 1 blast: Where are you? - 2 blasts: Come to me - 3 blasts: Distress

B.3 Ground-to-Air Symbols

Large, high-contrast symbols (strokes 6–10 m): V (assistance), X (medical), → (direction), Y/N (yes/no), SOS, F/W (food/water). Place in open areas near handrails.

Rule of Three: Three fires, three flashes, three blasts—repeat with gaps.

Appendix C

Knots & Lashings

C.1 Core Knots

- Bowline: Fixed loop; rescue and tarp corners
  - Steps: Make a small loop; the "rabbit" comes up through the loop, around the "tree," and back down the hole. Dress; leave a long tail; add stopper.
  - Uses: Secure around trees/posts; tie-in for non-dynamic loads.
- Sheet Bend: Join lines; use double for slick/uneven lines
  - Steps: Make a bight in the thicker line; pass the thinner line up through the bight, around both legs, and tuck under itself.
  - Uses: Extending guylines; tying dissimilar cordage.
- Clove Hitch: Quick anchor; back up with half hitch
  - Steps: Two turns around the object, second crossing over the first; tuck under the last pass.
  - Uses: Start lashings; temporary tie-offs.
- Constrictor: Powerful binding; difficult to untie
  - Steps: Like a clove hitch with an extra tuck under the crossing turn.
  - Uses: Bind bundles; repair broken straps; expect to cut to release.
- Taut-Line Hitch: Adjustable guyline
  - Steps: Two wraps toward the anchor on standing line; one wrap away; slide to tension.
  - Uses: Tent guylines; adjustable clotheslines.
- Trucker's Hitch: Cinch lines with 2:1 advantage
  - Steps: Anchor one end; tie a slip knot loop in the standing part; route the working end through the far anchor and back through the loop; pull to tension; secure with two half hitches.
  - Uses: Tarp ridgelines; load tie-downs.
- Prusik: Sliding friction hitch on rope
  - Steps: Wrap a loop of smaller cord 2–3 times around the main rope; pass loop through itself; dress evenly.
  - Uses: Progress capture; adjustable attachment on ridgelines.

C.2 Lashings

- Square: Join poles at right angles; start with clove hitch; make 6–8 tight wraps; add 2–3 frapping turns between spars to cinch; finish with clove.
- Diagonal: Stabilize crossing poles under strain; start with a timber hitch across the X; wrap each diagonal; frap; finish secure.
- Shear: Join two poles as a folding bipod; leave a small gap in wraps to allow pivot; splay legs; back-tie feet.

C.3 Applications at a Glance

- Shelter: Bowline at grommets → trucker's hitch to tree; taut-lines at stakes.
- Repairs: Constrictor to bind a cracked pole; clove to start a lashing; sheet bend to extend a guyline.
- Hauling: Trucker's Hitch for roof loads; add backups after the first mile.

Narrative — Storm Night, Three Knots When the squall hit, the A-frame sagged. You re-tied the ridge with a trucker's hitch until the tarp sang like a drum. A bowline at the windward corner stopped a grommet tear from spreading. On the leeward side, a taut-line made quick work of the last adjustment. Back in the bag went three wet gloves—and three knots you won't forget.

Appendix D

Water Purification Dosages & Boil Times

D.1 Chlorine (Unscented Household Bleach) Dosages

Strength varies by product; check label.

- 6% sodium hypochlorite
  - Clear water: 2 drops per liter (8 drops/gal); wait 30 min
  - Cloudy water: 4 drops per liter (16 drops/gal); wait 30–60 min
- 8.25% sodium hypochlorite
  - Clear water: 1–2 drops per liter (6 drops/gal); wait 30 min
  - Cloudy water: 3–4 drops per liter (12–16 drops/gal); wait 30–60 min

Slight chlorine smell should be present; if not, repeat dose and wait 15 more minutes.

D.2 Iodine Dosages

2% tincture (guideline; follow label) - Clear water: ~5 drops/L; 30 min contact - Cloudy/cold: Double dose and/or 60 min

Avoid in pregnancy/thyroid disease; less effective for Cryptosporidium.

D.3 Boil Durations by Altitude

Bring water to a rolling boil: - Sea level to 2,000 m / 6,500 ft: 1 minute - Above 2,000 m / 6,500 ft: 3 minutes

Notes - Boiling inactivates bacteria, viruses, protozoa; does not remove chemicals. - Cyanobacteria (blue-green algae) toxins are not reliably removed by boiling, filtering, or common chemicals—avoid suspect water entirely.

D.4 Chlorine Dioxide

- Follow manufacturer instructions (tablet/drop strength varies)
- Effective for bacteria, viruses, Giardia; requires up to 4 hours for Cryptosporidium

Mark treated vs untreated containers clearly to prevent mixups.

Appendix E

Conversion Tables

E.1 Metric/Imperial

- Length: 1 in = 2.54 cm; 1 ft = 0.3048 m; 1 mi = 1.609 km
- Mass: 1 lb = 0.454 kg; 1 kg = 2.205 lb
- Volume: 1 L = 33.8 fl oz; 1 gal (US) = 3.785 L

E.2 Distance-Pace

Pace (each left foot) for 100 m — calibrate in your terrain - Flat trail: ~60–70 - Rough trail: ~70–80 - Bushwhack/snow: ~80–110

1 km 10× your 100 m pace count.

E.3 Temperature/Wind Chill

Quick sense (approximate) - 0°C (32°F), 30 km/h (20 mph) wind feels like ~−10°C (14°F) - −10°C (14°F), 30 km/h (20 mph) wind feels like ~−20°C (−4°F)

Plan extra layers and wind breaks accordingly.

Appendix F

Radio Cheat Sheet

F.1 Channel Plans

Template (fill in and share)

- Primary: FRS/GMRS Ch **, tone** , check-ins at **:** and **:**
- Alternate: FRS/GMRS Ch **, tone** (or SMS on the hour)
- Contingency: Monitor Ch ___ 10 minutes past the hour
- Emergency: Meet at ___ by **; emergency services via**

F.2 Phonetic Alphabet

NATO Phonetic - A Alpha, B Bravo, C Charlie, D Delta, E Echo, F Foxtrot, G Golf, H Hotel, I India, J Juliett, K Kilo, L Lima, M Mike, N November, O Oscar, P Papa, Q Quebec, R Romeo, S Sierra, T Tango, U Uniform, V Victor, W Whiskey, X X-ray, Y Yankee, Z Zulu

Numbers (when clarity matters): WUN, TOO, TREE, FOW-ER, FIFE, SIX, SEV-EN, AIT, NIN-ER, ZERO

Radio Etiquette - Press-pause-speak; keep it short (WHO/WHERE/WHAT/INTENT) - Readbacks for instructions; use “Affirmative/Negative,” “Standby,” “Out”

Checklist — Handheld Setup - Battery charged; spare available - Channel and tone set; volume tested - Antenna vertical; move to higher/clearer ground for range

Appendix G

Checklists

G.1 EDC

- ID, phone, small light, whistle, small multitool/knife (legal)
- Cash small bills; bandanna; pen; PACE card; meds as needed

G.2 Get-Home Bag

- Water 1–2 L + filter/tabs; electrolytes
- Food 1,500–2,500 kcal no-cook; spoon
- Clothing layer, rain shell, socks, hat/gloves (seasonal)
- Map/compass; paper + pen; battery bank + cable
- Headlamp + spare cells; small first aid/bleeding control
- Tape, cordage 10–15 m, multitool, lighter/ferro
- Mask/eye protection per environment; small radio if used

G.3 72-Hour Bag

- Water 4 L/person/day; stove/fuel; pot/mug
- Food 6,000–9,000 kcal/person (3 days)
- Shelter: tarp/tent; pads; sleeping bags/bivies
- Lighting: headlamps/lanterns + batteries
- Hygiene/sanitation; meds; docs copies; cash
- Tools/repairs; radio; signaling; gloves

G.4 Vehicle Kit

- Tire plug kit + compressor; jack; lug wrench
- Jumper cables/jump pack; fuses; fluids (washer/oil/coolant)
- Triangles/flares; high-viz vests; gloves; flashlight
- Blanket; water; snacks; paper maps; traction aids; shovel (seasonal)

G.5 Home Blackout Kit

- Lights/lanterns + batteries; battery bank; inverter
- Cook stove + fuel; water; food; manual can opener

- HEPA/filters; fans (heat); safe heaters (cold)
- Radio; charger cables; extension cords; CO/smoke alarms

Appendix H

Blank ICS-Style Forms

H.1 Message Form

From: _____ To: _____ Date/Time: _____ Priority: [ ] Routine [ ] Urgent [ ] Emergency

Subject: _____

Message: _____ _____
_____

Reply/Action: _____ _____

Logged by: _____ Time: _____ Method: [ ] Radio [ ] Phone [ ] In person

H.2 Task Log

Task #: _____ Owner: _____ Start: _____ Due: _____ Status: [ ] Planned [ ] In Progress [ ] Done

Description: _____

Notes/Updates (time-stamped): - _____ — _____ -
_____ — _____

H.3 Situation Board

Incident: _____ Start: _____ Current: _____

Objectives (top 3): 1) _____ 2) _____
3) _____

Resources/Constraints: - _____ - _____

Actions/Decisions (time-stamped): - _____ — _____
- _____ — _____