Choosing Plan B

A data-driven framework for picking backup climbing objectives in Washington when the weather won't cooperate

THE SHORT VERSION

You have a mountain you want to climb, but the weather over there might be bad. This framework — and the interactive map that comes with it — helps you pick the **backup peaks most likely to have good climbing weather instead**. The core finding, from 20 years of daily weather across 500 Washington peaks: when a storm ruins your primary objective, **the whole region usually takes a hit at once**, so the goal isn't to find a peak that's magically good — it's to find the one that stays **least bad**. Most often that's a dry peak east of the Cascade crest. But it depends on the weather pattern: a wet ocean storm sends you **east**, while a dry spell may favor the **south**. And this backup strategy has the most value in **summer**, when the ranges behave independently.

This report explains the principles, the data, the method, and — importantly — the limits of what this can and can't tell you. It is a planning aid built on historical weather, not a forecast and not a safety assessment.

1. The problem this solves

Every Washington climber knows the pattern: you've planned a route on Shuksan or Eldorado for weeks, and three days out the forecast falls apart. The instinct is to scramble for an alternative — but which one? Driving four hours east only to find the same storm followed you is a wasted weekend. The question this framework answers is simple to ask and surprisingly hard to answer by gut alone: **given my primary objective and the weather that's coming, which other peaks give me the best odds of actually climbing?**

The answer isn't fixed. It changes with the season and — crucially — with the *type* of weather moving in. This document lays out why, backed by two decades of data, and describes a practical decision framework you can use with the companion interactive map.

2. The principles, in plain terms

2.1 The rain shadow is the single most important fact

Washington's weather almost always arrives from the west, off the Pacific. When that moist air hits the Cascade and Olympic mountains it's forced upward, cools, and dumps its moisture on the **western** slopes. By the time the air crests the range and descends the **eastern** side, it's wrung dry. The result is one of the sharpest precipitation gradients in North America: western peaks like Mt Baker average over 200 inches of precipitation a year, while peaks just 50 miles east in the Methow and Pasayten see under 30 inches (Figure 1).

For a climber, this is the foundation of every backup plan: **when the west is getting hammered, the east is often the driest ground within a few hours' drive.**

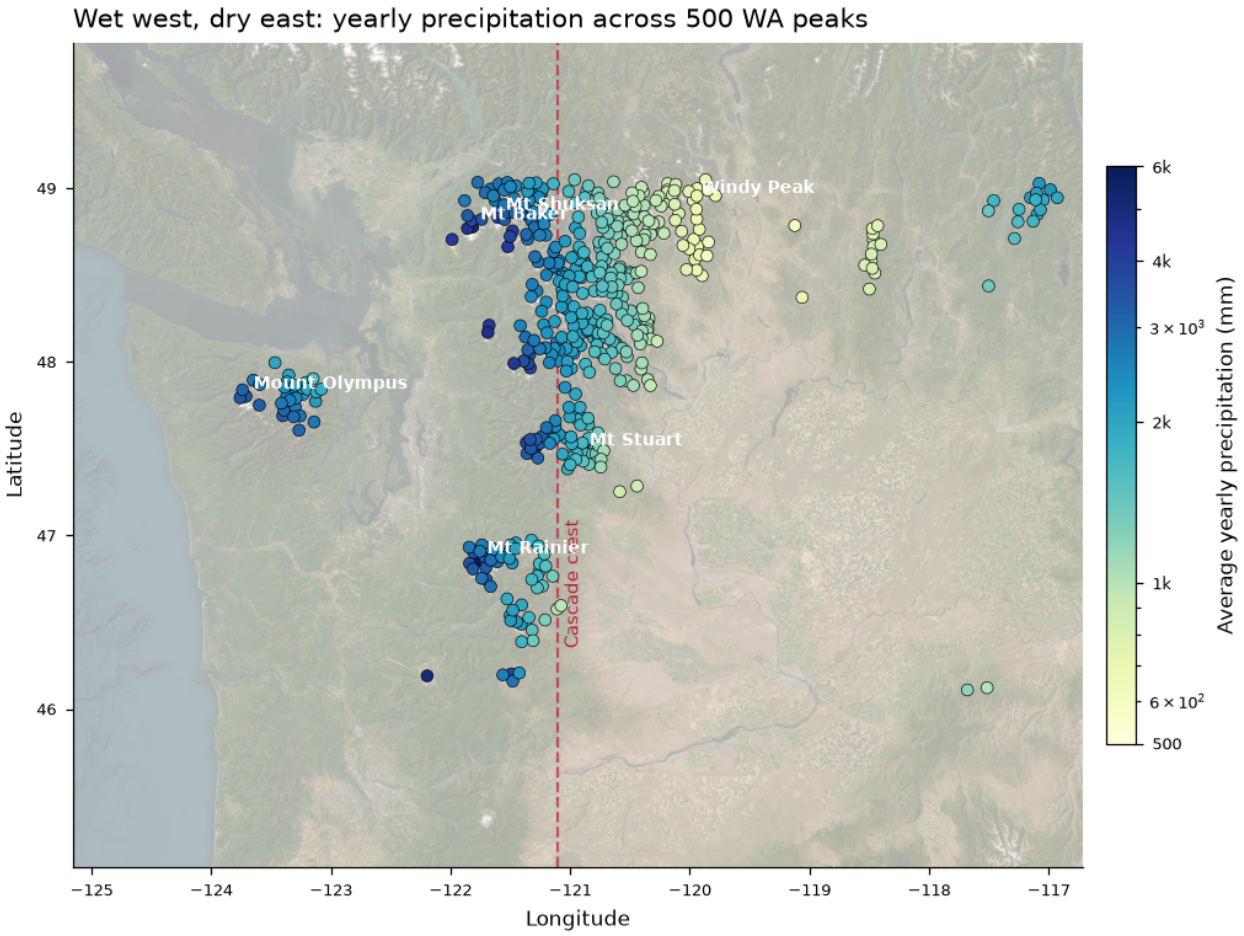


Figure 1. Average yearly precipitation at 500 Washington peaks. Wet western peaks (dark blue) give way to dry eastern peaks (pale) across the Cascade crest — up to a 7× difference. This gradient is the physical basis of the plan-B strategy.

2.2 Bad weather is regional — so backups are about “least bad”

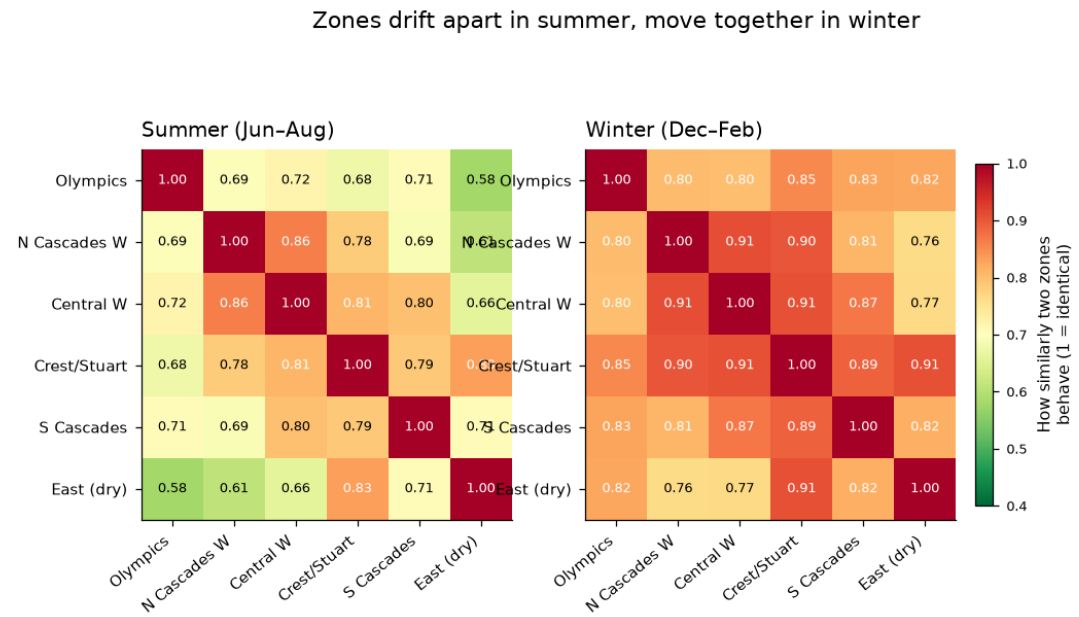
A natural assumption is that some peaks are *good when others are bad* — that you can always find a mountain sitting in the clear. The 20-year data says this is mostly wrong. Washington's storms are large; when one moves in, it tends to affect most of the mountains at the same time. Measured directly, the day-to-day weather at nearly every pair of peaks is **positively related** — they get wet together and dry out together.

This reframes the whole problem. When your objective is stormed out, **every** peak's odds drop below their own average — there is rarely a peak sitting pretty. The realistic goal is to find the peak that **degrades the least**. On a wet southwest storm day, that's the far-eastern dry country, which still might offer a 50% chance of a climbable day while the western peaks sit near zero.

2.3 The advantage is seasonal

The zones of Washington behave most independently in **summer** and most similarly in **winter** (Figure 2). In deep winter, storms are so large and frequent that they blanket the entire state — hopping to a backup buys you little. In summer, weather is more localized: a marine push might sock in the west while the east

bakes in sunshine. This means the plan-B/C strategy delivers the most leverage exactly during the core climbing season.



Lower numbers (greener) = more independent = better backup potential. In summer the dry east decouples from the wet zones (down to 0.58); in winter big storms hit everything at once (0.76–0.91).

Figure 2. How similarly the mountain zones behave, summer vs. winter (1.0 = they rise and fall together). In summer the dry East decouples from the wet zones (as low as 0.58 — the greenest cell); in winter everything couples tightly (0.76–0.91). Backup-hopping pays off most in summer.

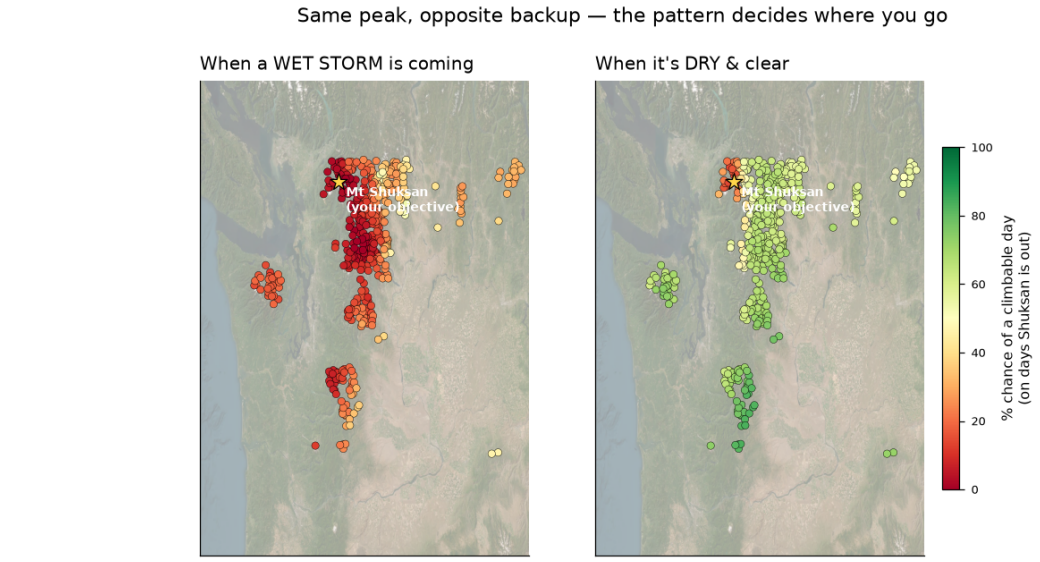
3. Weather patterns decide where you go

The most useful thing the data revealed is that Washington's weather sorts into a handful of **recurring patterns**, and the best backup depends on which one is in play. Using 20 years of daily precipitation and wind direction, every day was classified into one of five patterns. Two of them matter most for decisions:

> **Wet storm flow (wind from the southwest)** — about 1 in 5 days, mostly in the cooler months. Warm, moist air streams off the Pacific (climbers know the strongest version as the “Pineapple Express”). This produces the heaviest rain on the western slopes and the **strongest** rain-shadow contrast. This is the classic day to bail **east**.

> **Dry northwest flow / high pressure** — about half of all days, common in summer. Cool, dry air or a stubborn ridge of high pressure. Nearly everywhere is climbable, and a backup barely matters.

The remaining three patterns are moderate or transitional versions of southwest flow. The practical upshot is captured in Figure 3: for the **same** primary objective (Mt Shuksan, stormed out), the best backup is a completely different set of peaks depending on the pattern.



Both maps: Mt Shuksan is stormed out. In a wet SW storm (left) the dry EAST holds up best. In dry NW flow (right) the SOUTH is better. The best Plan B flips with the weather pattern.

Figure 3. Both maps show days when Mt Shuksan (gold star) is *not* climbable, colored by each other peak's odds. **Left (wet storm):** the whole west is red — the dry EAST holds up best. **Right (dry spell):** the SOUTH and much of the state is green. The best Plan B flips with the incoming pattern — which is why the interactive tool has a pattern selector.

4. A simple decision framework

Putting the principles together, here is the practical sequence — matched to how far out you're planning:

> **~1 month out:** You can't forecast weather this far ahead. Use the **typical** odds for the season (the map's climatology view) to shortlist a primary plus two or three backups that sit in different zones — ideally one wet-west objective and one dry-east alternative.

> **~1–2 weeks out:** Check the live forecast. Identify the dominant pattern. If wet southwest storms dominate, lean your plans toward the dry east; if it's dry and settled, almost anything goes and you can prioritize the objective you most want.

~2–3 days out (commit): This is the reliable window. Confirm the pattern, pick the specific peak with the best odds for that pattern, and — always — check a real mountain forecast and avalanche bulletin before you go.

The rule of thumb behind it all: **match your objective to the pattern, not the other way around.** A dry-east peak isn't just a foul-weather fallback — as Figure 4 shows, it stays climbable far longer into spring and fall, extending your season.

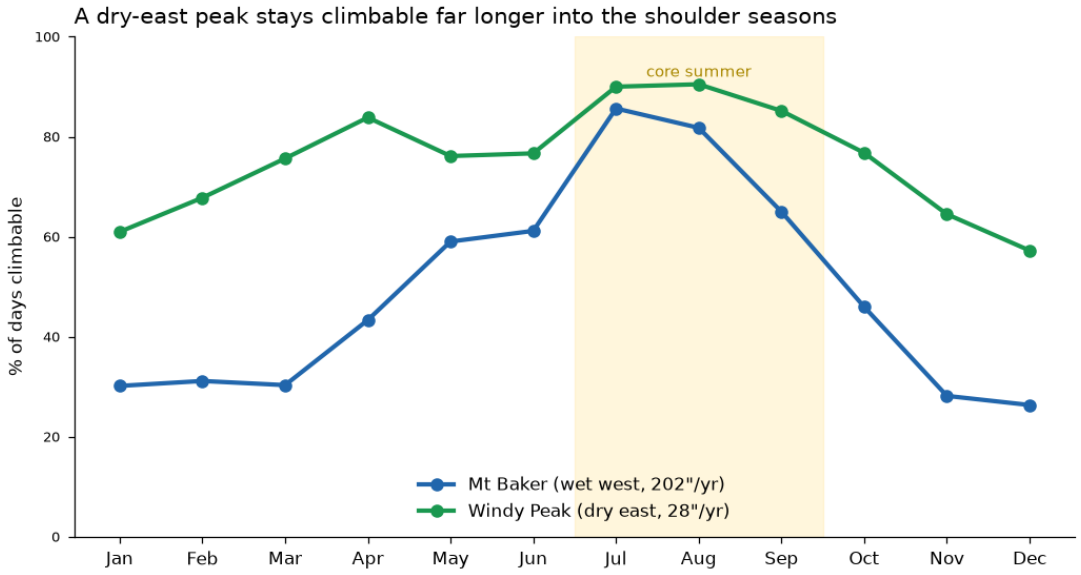


Figure 4. Percentage of climbable days by month for a wet-west peak (Mt Baker) vs. a dry-east peak (Windy Peak). Both are excellent in mid-summer, but the dry-east peak keeps roughly twice the climbable days through the shoulder seasons — the rain shadow at work.

5. Data and method

5.1 What went in

500 peaks statewide. The 100 highest Washington peaks (the well-established “Bulger List”), plus 400 more from OpenStreetMap so every range is represented: the Olympics, both sides of the Cascades, the northeast highlands, and the Blue Mountains. The 400 extended peaks have approximate elevations.

20 years of daily weather (2004–2023). Daily precipitation, temperature, and snowpack from Daymet — a free, gridded (~1 km) government surface-weather dataset — sampled at each summit. About 7,300 days per peak.

20 years of daily wind direction from NASA POWER, at five points spanning coast to dry interior, used to identify which weather pattern each day belonged to.

5.2 The “climbable day” definition

A day counts as climbable at a peak when it has **3 mm or less of precipitation** and an **overnight low of −15 °C or warmer**. This is a deliberately simple, transparent proxy for “a dry day that isn't brutally cold.” It is a choice, not a universal truth — see the limitations.

5.3 How the analysis works

Each of the 7,300 days was grouped into weather patterns using its statewide precipitation shape and dominant wind direction. To rank backups for a given peak, the tool identifies every past day that peak was not climbable, then ranks all other peaks by how often they *were* climbable on exactly those days. The live-forecast feature pulls the coming 14 days, classifies each into the same patterns, and shows the day-by-day outlook.

6. Limitations — please read

This framework is only as good as its assumptions, and honesty about its limits is what makes it trustworthy:

It is not a forecast for your climb day. The colors and odds are historical *typical* values. For an actual trip, use the live-forecast view and a real mountain forecast.

Good weather does not mean safe. The framework knows only about precipitation, temperature, and wind pattern. It knows **nothing** about avalanche hazard, route-specific snow and ice, rockfall, glacier conditions, wildfire smoke, or road and trailhead access. A peak with great weather odds can still be dangerous or impossible. Always consult the Northwest Avalanche Center and current conditions.

It is a broad-brush picture. The ~1 km weather grid smooths over very local terrain effects — lee slopes, valley inversions, individual summit exposure. And 400 of the 500 peak elevations are approximate.

The forecast pattern-matching is approximate. It reproduces the historical patterns about 70% of the time overall, and best (~87%) on the decision-critical wet-vs-dry distinction. Days 8–14 of any forecast are trends, not specifics.

The thresholds are choices. The 3 mm / –15 °C definition of a climbable day is reasonable but arbitrary; a rock climber and an ice climber would draw the lines differently.

7. Sources & tools

Weather data: Daymet (Oak Ridge National Laboratory / NASA) and NASA POWER — both free and public. Live forecast: Open-Meteo. Peak roster: the Bulger List and OpenStreetMap. Basemaps: Esri World Imagery, OpenTopoMap, and USGS. Analysis in Python (NumPy, scikit-learn, matplotlib).

Built as a personal decision aid for planning climbs in Washington. Always verify against official forecasts and avalanche bulletins before committing to any objective. Weather can kill; this document cannot.