

GOLD PROSPECTING

A Complete Field Guide

Geology · Identification · Panning · Extraction

From reading the landscape to recovering your find — everything a prospector needs to know.

Hunt the signs of a gold system — not just gold color.

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Gold exploration is the science and art of finding economically viable gold deposits. It combines three core disciplines: geology, geochemistry, and drilling. Successful prospectors understand that finding gold starts with understanding the ground beneath your feet.

The Three Pillars of Gold Exploration

■ GEOLOGY	■ GEOCHEMISTRY	■ DRILLING
Analyzes soil, rock, and mineral samples to identify gold-bearing structures, faults, and alteration zones.	Identifies geochemical signatures and anomalies in the field and lab to locate gold deposits.	Drills holes to test depth, width, and continuity of mineralization.

Where Does Gold Come From?

Gold originates deep within the earth, carried upward by hydrothermal fluids through faults and shear zones. As these superheated fluids cool, gold precipitates and crystallizes — often in quartz veins. Over millions of years, erosion breaks down these primary deposits and redistributes gold into rivers and streams as placer deposits.

Deep Earth Fluids	Faults & Shear Zones	Crystallization
Hot mineral-rich water rises from deep magma sources, carrying dissolved gold.	Structural weaknesses act as conduits, channeling gold-bearing fluids to the surface.	Gold precipitates as fluids cool, forming veins in quartz and sulfide minerals.

Gold does not occur in just one form. Understanding the different deposit types tells you what to look for, where to look, and how to extract it.

DEPOSIT TYPE	KEY FEATURES	WHAT TO LOOK FOR
1. Orogenic (Quartz Vein) Gold	Free gold in quartz veins. Formed during mountain building.	White to grey quartz veins in metamorphic rocks.
2. Porphyry Gold (Cu-Au)	Gold associated with large copper deposits. Found in igneous intrusions.	Alteration zones, stockworks, leaching, and large-scale drainage.
3. Carlin-Type Gold	Microscopic gold locked in sedimentary rocks.	Dissemination, karst, and major anomalies in the host rock.
4. Placer Gold	Gold eroded from primary sources and deposited in secondary locations.	Rivers, streams, and beaches. Easy to find in black sand concentrates.
5. Epithermal Gold	Shallow-formed gold in volcanic terrains. Often associated with geysers and hot springs.	Silica-rich veins, associated alteration, and high-temperature veins.

What Is Bedrock?

Bedrock is the original solid rock found underneath soil, sand, and gravel. Think of it like the concrete floor under a stream. It is NOT soil, loose gravel, or clay — it is solid, unweathered rock.

Why Gold Sinks to Bedrock

The golden rule of placer gold: gold is very heavy — approximately 6 to 7 times heavier than sand and gravel. While sand floats and washes away, and gravel moves with floods, gold always sinks downward until it reaches bedrock. Once there, it falls into cracks and stays trapped — sometimes for thousands of years.

■ GOLDEN RULE ■

Don't look for gold... look for the place where gold stops moving.

Where Gold Hides in Bedrock

HOW GOLD GETS TRAPPED	WHERE TO FIND BEDROCK CRACKS
<ul style="list-style-type: none"> • Falls into cracks and fractures • Gets lodged in small holes and pockets • Sticks inside rough, broken surfaces • Stays trapped for thousands of years <p>Imagine dropping a coin between floor tiles — it's almost impossible to get back out!</p>	<ul style="list-style-type: none"> • Exposed stream bottoms • Solid rock surfaces without soil cover • Long fractures and lines running through rock • Small holes, pits, and pockets • Rough, broken rock (not smooth) <p>The more cracks you see → the higher the chance of gold!</p>

Prospector's Secret: How to Work a Crack

- ✓ Clean the crack with a brush to remove loose material
- ✓ Remove all dirt and gravel from the opening
- ✓ Collect all material in your gold pan
- ✓ Wash slowly — gold will stay at the bottom

Beginner Mistake: Most beginners dig only in sand and ignore bedrock entirely. Use a small screwdriver, spoon, or knife to pick cracks — not just a shovel.

Not every shiny rock holds gold. Learning to distinguish genuine geological indicators from misleading signs is one of the most valuable skills a prospector can develop.

■ MISLEADING SIGNS (Not Enough)	■ REAL GOLD INDICATORS (Promising)
✓ White quartz (plain, no fractures)	✓ Fractured quartz with iron oxide staining
✓ Shiny pyrite — 'fool's gold'	✓ Sulfide minerals (pyrite, arsenopyrite)
✓ Rusty-colored rocks (alone)	✓ Altered rock colors (red, yellow, black)
✓ Heavy stones without other indicators	✓ Faults and veins in bedrock
✓ Smooth river gravel	✓ Black sand concentrations
✓ Clean, white rock surfaces	✓ Quartz veins in bedrock with rust staining

Testing: From Doubt to Proof

The only way to confirm gold is to test your samples. Surface appearance alone is never enough. Use these three methods:

PAN FOR GOLD	CRUSH & CONCENTRATE	LAB ANALYSIS
The simplest field test. Pan material	Breaks suspect rocks. Any gold will	Get the bottom line on the materials

■ GOLDEN RULE ■

Samples tell the truth... not just the rocks!

Rocks That Host Gold & Silver

Knowing your host rocks is the foundation of hard-rock prospecting. Different rock types host different styles of mineralization.

ROCK TYPE	WHAT IT HOSTS	KEY INDICATORS
Quartz Veins	Native gold, electrum, silver minerals	White to grey veins in metamorphic or igneous rock
Volcanic & Metamorphic Rocks (Schist, Gneiss, Amphibolite)	Chlorite, Epidote, Pyrite	Green coloration, foliation, alteration halos
Sulfide Ores (Pyrite, Arsenopyrite)	Refractory gold, silver, copper	Brassy/metallic luster, cubic crystals, rust staining
Placer Deposits (River Gravels)	Alluvial gold nuggets, fine gold, platinum	Black sand concentrate, gold in pans
Ultramafic Rocks (Peridotite, Diabase, Gabbro)	Platinum Group Metals (PGMs)	Dark green to black color, olivine-rich, heavy

Prospector's Tip: The Three Keys

■ Hydrothermal Activity	■ Cracks & Veins	■ Heavy Minerals & Iron Oxides
Evidence of past hot water means gold may have been deposited nearby.	Structural pathways are the arteries of gold deposition. Follow the veins.	Where magnetite, hematite, and limonite accumulate, gold is often nearby.

Step 1: Choose the Right Location (80% of Success)

Location is everything in gold prospecting. Focus on valleys and streams that pass through ancient rocky formations or mineralized zones.

- Old riverbeds and dry stream channels
- Sharp bends in rivers and valleys
- Behind and downstream of large rocks
- Below small waterfalls where turbulence drops suddenly
- Above or around exposed bedrock formations

Step 2: Use Simple Tools

ESSENTIAL	OPTIONAL BUT HELPFUL
Gold pan (14-18 inch recommended)	Sluice box — processes material faster
Bucket for collecting material	Metal detector — finds nuggets at depth
Small brush and screwdriver	Hand lens or loupe (10x) for inspection
Classifier/sieve screen	Snuffer bottle for fine gold collection

Step 3: Gold Panning — The Easiest Practical Method

1	<p>Collect Material Take material from behind rocks, bedrock cracks, and rocky stream bottoms.</p>
2	<p>Fill the Pan Add material to your pan with water, submerging it fully.</p>
3	<p>Shake and Classify Gently shake in circular motions to stratify by density.</p>
4	<p>Wash Away Light Material Tilt the pan and wash away light sand gradually.</p>

5

Check the Bottom

Gold — if present — will stay at the bottom as a bright yellow speck or crescent.

5 Biggest Beginner Mistakes

- X Digging randomly anywhere without reading the geology first
- X Ignoring bedrock cracks — the #1 gold trap
- X Giving up too quickly after one unsuccessful area
- X Prospecting in areas with no mineral signs
- X Panning too fast and washing gold away with the light material

Gold is very heavy — about 6 to 7 times heavier than sand and gravel. Sand and clay wash away; gold drops quickly and stops moving. Gold accumulates only in specific places called gold traps.

1. Stream Bends	At a bend, the outside curve carries fast water that erodes material away. The inside curve has slow water that deposits heavy materials — this is where gold settles. Inside bends are some of the best places to find nuggets.
2. Behind Large Rocks & Obstacles	A rock acts like a barrier. In front there is strong current; directly behind it is a calm pocket called an eddy. Gold settles in this quiet zone. Search directly behind the rock, in the sandy pocket, and under accumulated gravel.
3. Bedrock Cracks	When gold reaches solid bedrock it cannot go deeper, so it falls into cracks and gets stuck. Gold settles in these quiet zones and can remain trapped for centuries. Any obstacle in water can be a gold trap.
4. Black Sand Concentrations	Black sand (magnetite and hematite) is heavy like gold, moves with gold, and deposits with gold. Where you find black sand in your pan, you are in a gold-bearing zone. Search in normal sand behind rocks and in bedrock cracks.

There is no gold site without geology. Before you start digging or panning, learn to read the landscape for signs that you are in gold-bearing country.

■ STRONG GEOLOGICAL SIGNS	■ FIELD SIGNS IN RIVERS & STREAMS
<ul style="list-style-type: none"> ✓ Quartz veins (broken and rusty) ✓ Color changes in rock (red, yellow, black) ✓ Heavy minerals including black sand and pyrite ✓ Fault lines and structural breaks in outcrop ✓ Alteration zones with bleached or clay-altered rock 	<ul style="list-style-type: none"> ✓ Gold found in bedrock cracks and inside bends ✓ Black sand concentrate in your pan ✓ Visible gold flakes or streaks in rock ✓ Iron staining on stream bottom rocks ✓ Tributary confluences with upstream gold-bearing geology

Misleading Signs to Ignore

■ PROBABLY WASTING TIME	■ PROBABLY ONTO SOMETHING
<ul style="list-style-type: none"> ✓ Shiny quartz with no fractures ✓ Clean, white rock with no alteration ✓ Smooth river gravel ✓ No black sand in pans 	<ul style="list-style-type: none"> ✓ Quartz veins in bedrock with iron staining ✓ Sulfides and pyrite present ✓ Faults and broken rock ✓ Black sand concentrates in pans

■ GOLDEN RULE ■

There is no gold site without geology!

#	ORE TYPE	DESCRIPTION	RECOVERY
1	Free-Milling	Gold easily separated by cyanidation or gravity. Found in quartz veins in granite. Concentrations up to 10 g/t.	90-95%
2	Refractory Ores	Gold locked within sulfide minerals. Requires roasting or pressure oxidation before cyanidation. Grades 1-10 g/t.	50-65%
3	Oxidized Ores	Formed from weathered sulfide ores. Gold more easily extracted after oxidation. Surface gossans. Grades 0.5-10 g/t.	85-95%
4	Alluvial Ores	Gold in loose sediment or riverbeds. Simple gravity separation. Nuggets can weigh grams to kilograms. Grades 1-100 g/t.	Up to 90%
5	Telluride Ores	Gold combined with tellurium. Requires specialized roasting or high-temperature smelting. Grades 1-10 g/t.	High to 95%

Understanding how gold distributes itself in a river system lets you target the richest concentrations. Paystreaks — ribbons of concentrated gold — follow predictable patterns based on water velocity and river morphology.

Major vs. Minor Concentrations

LOCATION	GOLD TYPE	EXPLANATION
Inside of meander bends (Point bars)	Both coarse and fine	Slow water on inside curves deposits all grades of gold. Major concentrations.
Riffles in bedrock streams	Coarse gold	Turbulence drops coarse gold behind riffle bars. High-value zones.
Tributary confluences	Coarse gold	Where streams merge, velocity drops suddenly. Major gold traps.
Behind bedrock obstructions	Coarser gold	The 'lee side' creates calm pockets. Secondary but reliable zones (B-spots).
Scoured pools	None or very little	High turbulence prevents deposition. Rarely productive.

Fine vs. Coarse Gold Distribution at Bends

Coarser gold concentrates closer to the faster water on the upstream edge of point bars. Fine gold travels farther, depositing away from the fast water — deeper into the point bar toward the bank. Erosion on the outside of bends picks up fine particles during floods and carries them to inside bars downstream.

■ GOLDEN RULE ■

Follow the paystreak upstream to find where gold concentration is highest — that leads you toward the source vein.

When the host rock speaks, the prospector listens. Learning to read quartz veins and identify the signs of mineralization separates productive prospectors from lucky ones.

■ STERILE 'BULL' QUARTZ	■ PRODUCTIVE 'VUGGY' QUARTZ
✓ Smooth, milky-white appearance	✓ Vuggy textures with open cavities
✓ Massive, unbroken texture	✓ Pyrite and sulfide mineral inclusions
✓ Lack of metallic minerals	✓ Iron gossan (rust-red) staining
✓ No iron staining or alteration	✓ Wall rock alteration halos
✓ No sulfide inclusions	✓ 'Boxwork' honeycomb structures

5 Field Markers for Ore-Bearing Quartz

1. Search for 'Vuggy' Textures	Open cavities and crystal-lined voids indicate late-stage hydrothermal fluid flow where gold often precipitates.
2. Identify Iron Gossan (The 'Iron Hat')	Rusty, ochre-colored staining from oxidized sulfides like pyrite is a primary indicator that the vein once held metallic minerals — and may still contain free gold.
3. Analyze Fracturing	Heavily brecciated (shattered) and re-cemented quartz suggests multiple tectonic pulses, increasing the chance of mineral deposition.
4. Look for Boxwork Structures	Honeycomb-like patterns left when original minerals leached out, creating traps for free-milling gold.
5. Examine Wall Rock Alteration	Look for 'halos' of sericite or chlorite in the bedrock bordering the vein, signaling intense chemical interaction with mineralizing fluids.

If the quartz is clean, the pan is lean — look for the rust. The "Iron Hat" or Gossan is one of the most powerful surface indicators of a buried gold system.

What Is a Gossan?

A gossan (also called the 'iron hat') forms when sulfide minerals like pyrite weather and oxidize at the surface. The iron in pyrite (FeS_2) oxidizes to form limonite and hematite — leaving behind distinctive rusty-red, porous, spongy rock. The cavities left by leached sulfides often concentrate free gold near the surface.

FIELD SIGNS OF MINERALIZATION

- Identify the Gossan: Search for 'Iron Hats' where oxidized sulfides leave spongy, cellular textures in the rock
- Target Sugary Quartz: Avoid smooth, glass-like quartz; gold precipitates in 'sugary' zones with high surface area
- Examine Pyrite Casts: Look for 'cubic voids' in bedrock where iron sulfides have weathered out, leaving space for gold
- Scan the Contact Zone: The highest gold concentrations often occur at the 'Selvage' — the margin between vein and host rock
- Verify Specific Gravity: Mineralized ore will have a higher heft than sterile rock due to heavy metallic oxides

Signs of a Live Vein

- Shattered Texture: Mineralized quartz is rarely solid — look for 'sugar' quartz shattered by tectonic pressure creating space for gold
- Oxidation Staining: Iron-oxide 'Gossan' — dark red or orange staining from breakdown of iron-bearing sulfides
- Sulfide Voids: Identify 'vugs' or small cubic holes where pyrite has leached out, often leaving free-milling gold
- Wall-Rock Alteration: Check for 'selvage' or softened, bleached host rock where it contacts the vein
- Specific Gravity Check: Mineralized quartz is significantly denser — compare heft against a known sterile piece

Greenstone belts are among the oldest and most productive gold-bearing terrains on Earth. They formed billions of years ago and host massive orogenic gold deposits worldwide — from Western Australia to Canada's Abitibi belt.

What Is a Greenstone Belt?

- ✓ Very old volcanic rock — typically Archean age (2.5+ billion years)
- ✓ Greenish color from chlorite and epidote alteration
- ✓ Hard and fractured — structurally complex
- ✓ Often rich in gold, hosted in quartz veins

Why Is Gold Found There?

During ancient mountain-building events, hot water moved underground through fractures in the greenstone. The water carried dissolved gold. As fluids cooled in structural traps, gold entered cracks and quartz veins formed. The gold is often found directly inside quartz veins within greenstone host rock.

Recognizing Greenstone Rocks

- ✓ Green or dark green color in outcrop
- ✓ Layered or banded structure (foliation)
- ✓ Many cracks and fractures
- ✓ White quartz veins cutting through the green rock

■ GOLDEN RULE ■

Green rocks + quartz + cracks + black sand = high chance of gold

Mineral-rich soil creates unique stress on plants. By observing vegetation changes from above or across a landscape, experienced prospectors can identify anomalous zones worth investigating.

Why Vegetation Changes Over Mineral Deposits

CAUSE	VISIBLE EFFECT
Soil chemistry changes from heavy metals	Unusual or stunted plant species
Poor water absorption from altered soils	Yellow, weak, or dying plants
Plant toxicity from arsenic and sulfides	Bare patches of soil, no growth
Different mineral content from surrounding area	Plant community differs from neighbors

Signs of Gold Below Combined with Vegetation

The combination of quartz veins + rusty/red soil + sparse or stressed vegetation at the same location dramatically increases the probability of mineralization. This triple signature is worth stopping to investigate.

Pro Field Tips

- ★ Compare areas: Look at surrounding vegetation to identify anomalous zones
- ★ Observe from above: Aerial or drone views reveal vegetation patterns invisible from ground level
- ★ Take soil samples: Geochemical analysis of soil under stressed vegetation can confirm anomalies

Finding Gold Underground Without a Metal Detector

You don't need expensive equipment to find gold below the surface. A systematic approach using geology, digging, and panning can reveal gold up to 50cm deep.

STEP 1: OBSERVE THE ROCKS

Key Signs of Gold Nearby:

- Quartz veins with iron staining
- Schist or gneiss bedrock
- Iron rust staining on surface
- Black sand in creeks nearby

Remember: Quartz + Rust + Black Sand = Promising Area

STEP 2: DIG & PAN THE SOIL

The Shallow Test Pit Method:

- Dig 30–50cm deep in a promising spot
- Collect 1–2kg of soil from the dig
- Wash it thoroughly in a gold pan
- Look for gold flakes or dust at the bottom

STEP 3: BEST LOCATIONS TO CHECK

River Bends	Bedrock Crevices	Base of Hills	Old Stream Beds
Slow water deposits gold on inside bend	Crack beds surface crevices	Always gold to be found	Washed channels may have deep buried gold

STEP 4: TEST THE SOIL BY HAND

Take a handful of moist soil. If it feels noticeably heavier than surrounding soil and contains small black grains, you are in a promising area. Heavy soil with black grains is a good sign. Use geology and gold panning together for the best results.

Most gold is invisible to the naked eye — but still highly valuable. Microscopic gold locked in hard rock hosts some of the world's largest gold deposits and is recoverable with the right techniques.

Where Is the Gold?

IN QUARTZ VEINS	IN SULFIDE MINERALS
Gold hides in tiny cracks and fractures within quartz veins as microscopic gold particles.	Pyrite is the most common sulfide mineral, and with copper, it is the most significant source of microscopic gold.

Why You Can't See It

Visible gold is typically larger than 0.1mm. Microscopic gold is less than 0.01mm — smaller than a grain of sand and thinner than a human hair. A microscope is required to see it directly. Despite being invisible, it can be present in concentrations exceeding 10 grams per tonne.

How to Extract Microscopic Gold (Step by Step)

1. Crush & Grind	Break rock and grind to fine powder less than 0.5mm. This liberates gold from surrounding minerals.
2. Concentrate	Use a gold pan, sluice box, or shaking table to separate heavy gold from lighter waste.
3. Extract	For refractory gold in sulfides: roast first to oxidize sulfides, then use borax or other concentration methods.
4. Smelt	Melt the concentrate with flux to produce a gold button or doré bar. Borax smelting is safe and chemical-free.

■ GOLDEN RULE ■

Most Gold is Invisible... But Still Valuable! No Mercury · No Cyanide · Safe & Chemical-Free Methods Available

Field Indicators of Wealth

Experienced prospectors recognize four key mineral signatures in the field that consistently point toward precious metal mineralization.

SIGNATURE	WHAT IT MEANS	WHAT TO DO
Heavy Black Sand (Magnetite & Hematite)	These heavy minerals act as gravity markers. When they magnetite, gold, black sand, stocks, the high	Use the magnet to separate black sand from the gold.
Iron-Oxide Gossans (Rusty Rock Surfaces)	Rusty, 'rotten' rock textures indicate where sulfides have weathered away. Gold surfaces with the color	Look for the rusty, spongy gold surfaces with the color.
Fractured Quartz (Mineral Pathways)	Structural pathways like micro-faults allow mineral-rich fluids to flow. Fractured quartz is a sign of	Follow the quartz with visible fractures, quartz, and other
Indicator Garnets	High-density silicate minerals often settle in the same bedrock as the precious metals. The presence of	Look for similar bedrock types. The presence of

Black Sand: A Beginner's Best Friend

Black sand is dark sand found in rivers, creeks, and beaches, primarily composed of magnetite, hematite, and ilmenite. Because these minerals are heavy like gold, they travel and deposit together. Where you find black sand concentrations, you are in the right environment for gold.

Best places to find black sand + gold:

- Behind large rocks and boulders
- Inside river bends (point bars)
- In bedrock cracks and crevices
- Below small waterfalls
- In natural holes and depressions on the stream bottom

The gold in a stream did not appear from nothing — it came from somewhere upstream. By following the gold upstream (backtacking the float), you can locate the primary lode source that is shedding gold into the drainage system.

The Prospector's Pathway

Identify Float: Look for 'rotten' quartz with vugs and heavy iron staining (limonite/hematite) on hillsides. Angular, crystalline gold indicates you are close to source.

Analyze Gold Morphology: Smooth, flaky gold has traveled far. Sharp, jagged gold suggests you are within meters of the primary lode source.

Follow the Paystreak: Trace the concentration of gold upstream until the trail goes cold to find the apex — the point where the vein intersects the erosion surface.

Contact Zones: Search for where sedimentary rock meets igneous intrusions. These geological contacts are prime lode locations.

Gravity Traps: Focus on the 'lee side' of large obstructions where water velocity drops suddenly — gold can travel no further.

■ GOLDEN RULE ■

Sharp, angular gold in your pan = you are close to the vein! Smooth, rounded gold = the source is further upstream.

Is This Site Worth Exploring?

FACTOR	WHAT TO CHECK
Geological Features	Quartz veins, schist, riverbeds with black sand, alteration zones
Terrain Check	River bends, old channels, exposed bedrock, gravel beds
Local History	Past gold mining activity in the area — old maps, records, local knowledge
Sampling Results	Panning shows black sand and ideally color (visible gold flakes)
Visual Geology	Iron staining, altered rocks, structural features consistent with gold

Signs of Substantial Gold

- Heavy mineral deposits: magnetite, garnet, ilmenite visible in pans
- Visible gold: flakes or streaks in rock or in pan
- Quartz with rusty stains: yellow or iron-stained veins in bedrock
- Sediment traps: inside bends of streams with black sand accumulation

Tips for Systematic Prospecting

Start Small	Test multiple spots systematically before committing to one location
Take Notes	Record all findings — location, depth, panning results, rock types
Safety First	Protect yourself and nature — obtain required permits and permissions
Pan for Color	Simple and effective — the gold pan is your most important diagnostic tool
Magnet Test	Check concentrate with a magnet — magnetic black sand is a positive sign

THE PROSPECTOR'S MASTER CHECKLIST

LOCATION

- Old riverbeds, dry channels, valley floors
- Ancient rocky formations and mineralized zones
- Areas with local gold mining history

GEOLOGY TO LOOK FOR

- Quartz veins — especially rusty, fractured, vuggy types
- Iron staining and gossan (rust-colored rock)
- Sulfide minerals: pyrite, arsenopyrite, galena
- Greenstone or metamorphic host rock
- Faults, shear zones, structural features

IN THE FIELD (WATER)

- Inside bends of streams and rivers
- Behind large boulders (calm eddy zone)
- Bedrock cracks and crevices — clean them out!
- Black sand concentrations
- Below waterfalls and rapids

YOUR PAN TELLS YOU

- Black sand present = promising zone
- Heavy, dense concentrate = good sign
- Gold color (yellow specks or crescent) = success!
- Angular gold = close to source vein

- Rounded gold = far from source

AVOID THESE MISTAKES

- Digging randomly without reading geology first
- Ignoring bedrock cracks
- Panning too fast and washing gold away
- Trusting shiny rocks alone (pyrite is not gold)
- Giving up after one unproductive area

■ GOLDEN RULE ■

Gold rarely screams 'I'm here!' — it whispers through geology. Hunt the signs of a gold system, not just gold color.