

Foreword

By paul_h1rs

Contrary to most forewords that I've read so far, it was not the author of the main essay that asked me to write a little paragraph, but it was me who wanted to contribute my share to this document so I asked him if I could do so.

How did we get here? Well, as probably many of you too I got hands on the Scourge Essay titled "Andrew: A Case Study on Civreplay Abuse". I remember looking at the 17 pages and feeling that something was off. Many of his movements didn't make sense to me. Why would the #1 rank player on CPL not immediately reveal the fog around his cap? How come he seems to get a above average amount of huts?

Of course those accusations came to life because he does something different than most people. It stands out. And he – according to the Scourge Essay – even overperformed with his odd method. Surely many of you and I admit I didn't fall short of this either, concluded that cheating would be the perfect explanation. Not too long ago we had a case, so the conclusion was not too far-fetched.

Then about two weeks after I first heard of it, I got a message from Andrew asking if I would review his defence document. "A little long but hopefully interesting" he called it. Already the length of it surprised me and I immediately asked myself if I was not too fast with judgement after all. Turns out the longer I read the document the more I got convinced that he didn't cheat. Now it is for you to read it and decide whether you want to stick with your initial gut feeling or not.

However before you get to it, I would like to point out one thing that I feel like gets overlooked to much in the conversation. Just because what he does doesn't fit the average CPL players way, it doesn't mean there's no idea behind it and it certainly doesn't mean it has to be worse.

For a minute, I would like you to take my perspective when I'm watching tryndaehe or Lege – both considered top players – going through their early game. It sucks. They barely micromanage their tiles correctly, they don't check if they have enough food so that when their settler pops out, they don't lose pop. I'm asking myself if they even know how to do it since for me it is standard practice. I'm serious about this. I believe there is a lot of room for improvement. So how come I don't just outperform them every game? The answer is easy: they outperform me on other parts of the game. I believe that while I excel especially in micromanagement and someone like noob634 excels on making the important macro decisions, it is Andrew who among other things excels on scouting and general unit movement making it more efficient than anybody else.

This is by no means uncommon; I remember people making fun of UTG for going builder first. A year later, the "odd" start had established itself until lately where the 1.75 huts on every map force you to open with a scout. Before I'm getting too nostalgic, I stop it here and tell you my opinion after reading through the whole document. Andrew showed me things I didn't know, reminded me of things I did know but didn't use and most importantly showed me that I should be much more radical while executing the things I already know. I hope you get to enjoy the read as much as I did.

Have fun and learn.

Introduction

Due to the sheer number of images and videos in this document, it may freeze for some readers. If this happens, message me on Discord for a lighter version.

Many players believe that Civ 6 scouting has been solved. You start with a warrior, build a couple of scouts, and move in an optimal direction. Conventional wisdom says that the optimal scouting pattern is to reveal the most tiles possible with each move, which is

the move that traverses the most tiles possible or potentially ends on a hill that can reveal the most information.

In a vacuum, this is correct, and most top players use this strategy.

And I'm here to tell you that it's suboptimal.

In this guide, I'll share the strategy and the secrets I've used to maintain the Rank 1 spot on the CPL FFA Leaderboard. I won't be limiting this discussion to scouting — scouting is merely one component of a cohesive macro strategy that I've evolved over years. At this point, I've even been accused of using “map hacks” because this strategy gives better results than that of conventional wisdom. **I 100%, categorically, and unequivocally, have never used any “map hack” in any way, shape, or form.**

The secrets I'll share in this guide will be novel and eye-opening to most of you who read this. They are all 100% above-board — influencing what you're allowed to influence, and playing the game according to the incentives of the system. There is a lot of secret sauce revealed in this guide, and while I'd still prefer not to reveal my alpha, I'm looking forward to seeing the implications on the Civ 6 ecosystem.

1. Andrew's Macro Modus Operandi (AMMO)

I'll present the modus operandi (MO) for my in-game macro strategy, its priorities, and its implications for scouting, settling, and thinking about the game. I'll layer in third-party commentary that contrasts this MO against conventional wisdom, and explain why my strategy is superior in my games.

2. Prepare For The Metagame

I'll explain the out-of-game preparation required to execute this strategy. Many players assume that the metagame is meaningless. However, it is

another game you'll have to get good at if you want to rise on the leaderboard. We'll also reveal an uncomfortable truth about CPL.

3. Why AMMO Works: Secrets About Hut Generation

We'll reveal how a bug in the map generation algorithm leaks information about hut locations on certain maps. We'll also introduce a novel analysis method designed to impartially assess under/overperformance and learn how AMMO works for other players.

4. Case Studies with Recent Games

We'll review the replay and VOD for every one of my recent games and games I've played years ago. We'll see how the MO has been consistently executed and the rational chain-of-thought that goes into each macro decision, and I'll fill in every piece of missing context needed to understand each move.

Because this section is 150 pages long, it will be split off into a separate document.

5. The Low Rolls

We'll counter the claim that my scouting performance is too consistently strong by showing examples of blatant misses and underperformance from every available game.

6. Afterword: The Dangers of Cherrypicking

We'll hear some words of wisdom from Mr Toes.

1 — Andrew's Macro Modus Operandi (AMMO)

There are five characteristic strategic choices that distinguish my macro MO.

A. Starting Units Beeline Tundra

Using the relative placements of jungle and forests to identify the nearest tundra and sending the first two units (especially on end-to-end landmass maps like Lakes) in that direction. At a similar depth in the tundra, they break and move laterally.

B. Scouting Settles is Tactical, But Should Be Avoided If Possible

Scouting settle locations is prioritized only if none exist and a settler is finishing soon, but as soon as there is sufficient proof of a suitable settle location, aggressively switch the scout to moving radially.

C. Don't Duplicate Work

Not scouting in a direction where natural movement of a civilian unit (particularly a settler), border growth, or another game mechanic would reveal tiles. Avoiding areas where we have information other players have already visited.

D. There Is No Danger

Work with the incorrect default assumption that nothing bad will happen to you. Yes, you read that correctly.

E. Prioritize Scout Buys

Buy a tile early as needed, but the first 60 gold you accumulate is almost always invested into a scout.

When used together, these five strategic choices give me a small but consistent early-game advantage over other players, and given that the fundamental principle of Civ 6 is compounding, this is usually enough to translate to a win.

I'll showcase each strategy in detail, first dissecting the conventional wisdom, and then explain how the MO I use is strictly superior.

These blue squares will include commentary by other high-skill CPL players giving their perspective on “conventional” wisdom.

A — Starting Units Beeline Tundra

How to think about Civ 6

Elephantguy says: Conventional wisdom is to reveal as many tiles with each move by moving scouting units as much as possible and going onto hills to reveal more tiles.

The conventional strategy represents a [greedy algorithm](#), where a player makes the locally optimal choice for every move. This is because 95%, if not 99% of conventional players believe that the metric to optimize is tiles revealed with each move. In a vacuum with no other information (such as out-of-context screenshots), this *is* the optimal move.

In a real game, this metric is also 90% correct. However, the remaining 10% is just as critical, and because of its omission, nearly all of the Civ 6 player base uses a totally suboptimal strategy.

The metric players should be optimizing for is the number of tiles revealed *over the long term, where the tile is uncontested by another player*.

The implications of this metric are far-reaching and result in fundamental changes to your macro decision-making from the very first turn of the game.

The fundamental principle of Civ 6 is compounding. If you have an extra point of production, and you can produce a settler a turn earlier, then you can settle a new city a turn earlier, which can produce another settler a turn earlier, and so on — your entire game is accelerated by an entire turn. Over the long run, if you can accumulate 5-10 turns of these advantages, then you're almost certainly going to win the game.

Apart from RNG (spawn diff), the largest accelerants of your game are early-game huts and city-states. The earlier the flat advantage, the more it can compound over the remaining turns in the game, and the greater the final advantage will be. An extra yield in the early game can be anywhere from 50-1000x stronger than the same yield in the late-game.

Therefore, rationally, you'd want to orient your early-game macro strategy around two things:

1. Finding more huts and city-states
2. Finding them ASAP

However, the most strategic thought most players give to these priorities is praying to RNGesus. In writing this guide, I was wondering why that's the case, but after talking with a number of top players, it seems more clear — most players can fully follow the logic and understand the reasoning behind AMMO, and in fact, they may be putting some of the concepts in action. However, everyone underestimates the amount of commitment required to fully execute AMMO, because it requires a fundamental rewiring of your brain in how you approach the game from the very first turn.

I can also see the appeal of just following the conventional strategy. You don't have to think too hard — only 1-2 turns ahead. And I also empathize with the emotional aspects of that strategy — moving your scout three tiles feels good. You get that dopamine hit from revealing a lot of fog. And you've been conditioned by your team flaming you for walking 1 tile onto a 1-3 hill instead of walking through 3 flat tiles.

So how do we actually execute Andrew's macro strategy?

First, let's consider what goals we should set.

1. We'd want to beeline to the areas with the highest density of huts and city-states.
2. We'd want to prioritize areas with good terrain to cover as much ground as possible.
3. We'd want to avoid areas likely already to be scouted by other players through a combination of:
 - a. Avoiding areas close to other players cities or the center of the map
 - b. Executing on this strategy earlier than anyone else
4. We'd want to avoid duplicating work, whether scouting through areas we've already scouted or going to areas where we know other players have come from.

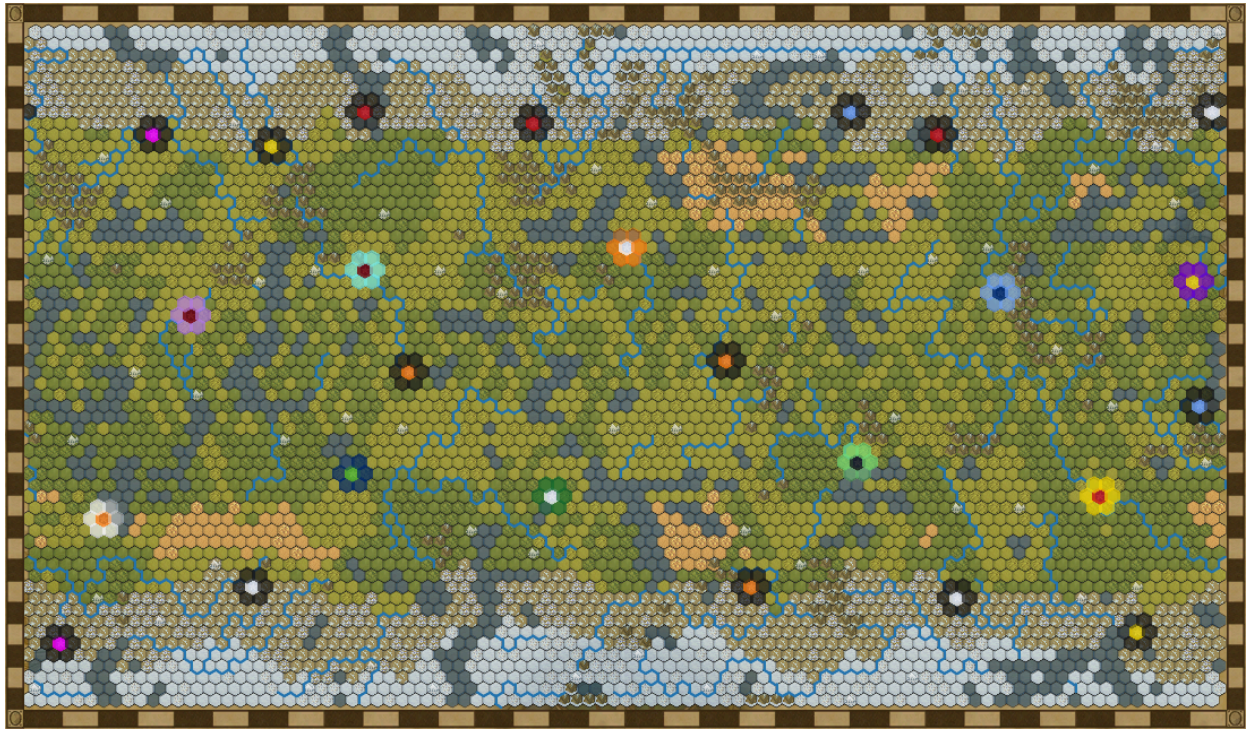
If we can achieve just one of these goals, we've already created a small advantage for ourselves. If we can somehow achieve two at once, we've compounded our efficiency. As it turns out, we don't have to limit ourselves.

Market Inefficiency: Tundra EV is substantially higher yet undervalued

EV = https://en.wikipedia.org/wiki/Expected_value

The first component is to make the tundra the first priority for scouting. All but two civs have a non-tundra spawn bias (BBG has made no-spawn bias an anti-tundra bias), and both of those civs (Russia and Canada) are less common in the current FFA meta. Therefore, in map generation, most of the players are crowded in the middle third of the map, leaving the lateral tundra bands at both poles empty. At this point, huts and city-states are placed over the remaining space, which overwhelmingly happens to be tundra placements. Hut placement is less strict than city-state placement, but what you end up seeing is tundra having a similar to above-average density of huts (depending

on map type) compared to the rest of the map and a substantially higher density of city-states.



In this Lakes game, you can see that of the 15 city states in the game, 12 are in the tundra. Counting the tiles, we can see that the tundra has a city-state density of 158 tiles per city-state, while the non-tundra has a city-state density of 1286 tiles per city-state. You have to explore over eight times the tiles in non-tundra to reveal the same number of city-states as tundra.

On top of this, tundra is rarely contested by other players, for multiple reasons. First, many players feel the need to scout their neighbors, whether to protect themselves against potential aggressors or to assess the danger they're in. Therefore, they tend to orient their units towards the center of the map, where they know other players will be found. Many players also feel a need to scout multiple settle locations, which as we'll discuss later, is suboptimal. Also, nearly all players use the conventional greedy algorithm for scouting, which paths scouts somewhat aimlessly.

Tundra also has favorable terrain. Tundra is considered the "dry" part of the map, meaning that there are fewer features to slow your movement. Ice terrain takes this one

step further, where no features are allowed to spawn on ice tiles. In certain maps where there is a substantial amount of ice, typically the lakes/highlands types of maps, the optimal strategy is to prioritize ice, as the hut distribution is similar and other players tend to have an even greater aversion to scouting ice. In general, this terrain means that once you're able to reach the tundra, you can move your scout substantially faster. Compare this to the center of the map, which many players send their units towards. The center of the map is "wet" with a substantially higher density of jungles and forests on each tile, slowing the movement of each unit to a crawl.

Prioritizing tundra from turn 1 is key

Many players know that tundra often holds strong city-states, and therefore will eventually scout the tundra. But as we've just read, tundra is unconventionally strong, and if you want to consistently reap its rewards, you need to prioritize it from the start of the game.

Don't forget that the fundamental principle of Civ 6 is compounding. This is the quintessential positive feedback loop that leads to compounding. If you find more huts, your scouts get more promotions, which allows you to move further and reveal more tiles, which leads to more huts. If you delay this cycle, you may miss the critical mass that is required to make it work — your huts may be gone, or it's too late in the game for the huts to have a meaningful impact. In a game about exponential growth and compounding, reaping a flat yield 5 turns earlier can double your stats at a typical benchmark turn like turn 81.

This is why you'll see me typically prioritize my earliest units to scout the tundra exclusively. Their entire job is to get into the tundra. They may be assigned conflicting short-term goals as necessary, e.g. find another player for writing boost, or scout for a settle location if necessary, but their overarching task is to get into the tundra and find everything worthwhile.

Lakes and Highlands are particularly bountiful. Not only are the bands of tundra circumnavigable, they are also guaranteed to be extremely large and unoccupied. On these maps, I'll send my two earliest units together into the tundra to scout in opposite directions to cover as much ground as early as possible.

Caveats

This strategy is particularly strong and consistent on Lakes and Highlands, but a number of potential pitfalls need to be considered on a case-by-case basis.

Currently, Canada and Russia are not particularly strong FFA civs and aren't played in the current meta as much as they used to be. However, if you are in a game with them, you'll need to adjust your scouting priorities as soon as you have an indication that they may be ahead of your units. As we'll discuss later, we do not want to duplicate work.

There are caveats on other map types beyond Lakes and Highlands. Pangea typically has reasonably consistent tundra, but depending on sea level generation may have a high sea level on one or both of the poles. More likely than not you can still execute this strategy, but it is less consistent. Inland sea also has a strong band of tundra, but the lack of circumnavigation and the huge sea in the middle tends to push players out towards the tundra, making the strategy weaker. Seven Seas is high variance, as you may or may not have large bands of tundra purely from map generation. You can still use this strategy on Seven Seas but need to be willing to abort as soon as you see indications that your unit isn't approaching a tundra band.

Spawning far away from either tundra is also detrimental, but not catastrophically so. I would personally say that only two out of the ten civs in a 10 man lobby spawn close enough to the equator for me not to consider not using this strategy, but this usually only comes into consideration when you are playing equator spawn bias (i.e. jungle spawn bias) civs like Brazil or Kongo. So in most cases, you should have a reasonable understanding going into a game of whether you will be spawning close to a tundra or not based on the map type and the other civs in the game.

Representative Examples



In this Maori game, I know that the map type is Lakes, so I can expect a large tundra band with an above-average density of huts and city-states. I see jungle to the south with my starting settler's vision, so I send my first two units (my starting warrior and 1st scout) immediately to the tundra, which I know is to the north.



This Germany game is also on Lakes, so I know I also need to prioritize the tundra more. I know the tundra is to my south because my starting settler sees jungle north of the forested area it's currently in. Therefore, once again, I send my first two units (starting warrior and scout) straight into the tundra.



In this Persia game, I need to find a strong first settle, so my warrior prioritizes that first (we'll discuss when this needs to be prioritized in the next section). As a result, however, the first scout I produce is sent directly into the tundra. Because this is Pangea and not Lakes or Highlands, I wait to see the extent of the tundra before sending another scout to scout the other side of the tundra.



In this Aztec game on Pangea, my capital only sees forest, so I don't know if I am closer to the north tundra or the south tundra. However, I know that I am close to tundra because there is no jungle in my vision. Therefore, I send my starting warrior south and my first scout north, knowing that one of them will be entering the tundra quickly. By the time my second scout finishes, I've learned that the tundra is to my south, so I start sending my second scout southeast with the aim of scouting the remaining tundra as my warrior breaks off to the left.



In this Gilgamesh game on Pangea, I send my first scout into the northern tundra. Since I have already seen that I am on the west coast, I know that in order to cover the entire tundra, I only have to move one scout there and then move it laterally. Another scout aims for the southern tundra, but since it sees coast under Babylon, I know there is no substantial tundra on the bottom of the map.



This game was played in 2022, showing that I've been executing this strategy for years. My starting vision reveals jungle to the south and forest to the north, indicating that the nearest tundra is to my north. Since I am coastal, I once again know that I only need to send one unit up so that I can traverse it laterally. I send my starting warrior to the north and once it reaches the end, start moving it directly west to traverse the tundra. My first

scout, on the other hand, aims for the southern tundra but sees coast at the bottom of the map, giving me information about the lack thereof.



In another Pangea game from 2022, my starting warrior once again heads straight to the south as jungle to the north enables me to infer the direction of the tundra.

B — Scouting Settles is Tactical, But Should Be Avoided If Possible

The exception to the tundra rush

There is one situation where I will temporarily reorient my macro strategy away from tundra, and that is to scout for a settle location. The MO here is straightforward — I make this temporary change when:

1. I haven't found a sufficiently good settle OR
2. I see indications but not evidence of a stronger settle than what is available

AND

3. I have a settler finishing soon in a nearby city

At any time this statement is false, I prioritize the tundra with the first 1-2 units, and then spread the remaining radially.

A sufficiently good settle tends to be a city location with a 2-2 or 3-1 base and at least a couple of 2-2s in the first ring.

However, you often have indications that there is a stronger settle that can be achieved. Notably, settling towards the center of the map is almost always a stronger choice. It is predominantly rainforest, which only spawn on plains, which means there is a high likelihood of a 2-2 base settle (especially on new world age), it is wetter with more features which means there's a higher density of high-quality 4 yield tiles, and the best luxes tend to spawn in jungle and give even more bonuses to already-good 2-2 tiles.

The one characteristic gameplay difference between myself and other players is that as soon as I find sufficient evidence of a good settle, the unit needs to go back to "go far away" mode.

Conventional wisdom is to reveal the fog around your land to find multiple settle locations. You will have to find places to settle, that's for sure, but the way that most players (both lower skill and higher skill) approach this is to invest early military units to this, in an attempt to reveal the fog around their land.

Compare and contrast



In this example from a mid-skill player, they devote three of their early units (starting warrior, scout 2, and scout 3) to circling their land and “revealing the fog.” But let’s think critically for a moment. Earlier we explained how Civ 6 is a game about compounding. This player spawned near the tundra, sent their first scout to the tundra, and lo and behold, got rewarded with 3 city-state first meets (tundra “luck” strikes again) and multiple huts. However, instead of sending another scout to reveal the northeast tundra for more tundra “luck” they sent it back in a circle. At the end of 30 turns, they’ve scouted enough land for 10-12 cities.

What would’ve impacted their game more:

1. Scouting northeast to laterally traverse the tundra like their 1st scout did and likely reaping similar benefits as their northwest scout?

OR

2. Find the optimal location for their 10th settle in the area of the map that will tend to have weaker settles anyway (i.e. further away from the equator)

Based on how I've presented it, the answer should be obvious. Yet this isn't what they did. For all intents and purposes, scouts 2 and 3 are close to worthless. Not only are they doing work that won't be needed for another 30 turns and would probably be achieved naturally even without those units, but moreover they are forgoing the entire "luck" on the northeast side of the tundra. This player is in the perfect position to replicate my strategy (in fact, they've already reaped the rewards with their northwest scout — multiple huts and city-state first meets) but have thrown away their lead with the wasted movement from the rest of their units. If only they had this guide...



Contrast this to my scouting from the same game. As soon as my first warrior finds a sufficiently good settle for my B2, it books it to the tundra, and I'm able to settle my first city. Even though more equatorial cities tend to be stronger, I find a sufficiently strong settle with my first scout going to the tundra, and settle my B3 there. With my second and third scout I scout radially, and my third scout happens to find a strong settle for my fourth city by the time that settler comes out. Only at this point do I commit resources to finding another settle when I buy a scout in my B2 to find a settle location for the settler that the city is about to finish.

Compare and contrast the gameplay. We've both managed to find strong settles for our first five cities. But unlike the other player, none of my units have needed to explicitly prioritize lifting the fog around my empire and are therefore able to prioritize the tundra or race away radially. With the military resources that I've freed up, I've taken my own shot at some tundra "luck" (although in this case, even though I have double the units scouting the tundra, I get fewer huts and fewer city-state first meets than the other player), and I have tendrils into over half the map by turn 30.

C — Don't Duplicate Work

The Fundamental Principle

Beelining tundra and minimizing scouting settles exemplify a more fundamental principle of AMMO: avoid duplicating work.

Civ 6 is a game about compounding, but that also means that it's a game about opportunity cost. In the scouting context, this means for every move your scout makes, you incur the opportunity cost of not picking one of the other options. Scouting's contributions to compounding predominantly comes from huts and first meets.

With this frame of thinking, it should be pretty obvious that duplicating work is therefore the worst choice in nearly all situations. If you walk over land that you know another player's unit has explored, you are intentionally grieving yourself by guaranteeing that you'll find no huts.

The Cognitive Disconnect

I'm highly confident that the vast majority of the playerbase will wholeheartedly agree that Don't Duplicate Work is a near-axiomatic guiding principle. However, I also know for

a fact that most players aren't implementing this principle in the cases that actually matter.



Let's say your starting warrior has been moving southeast, and you plan for it to continue southeast.

What would you do when it meets the Portuguese warrior?

For the vast majority of players, they'll think about whether they want to friend them, accept/send the friend request, and then switch to the next unit without the thought of modifying their warrior's trajectory ever crossing their mind.

Congratulations, they've just grieved themselves.

They've just been handed over a critical piece of information. With the settler lens, comms, or even facts like knowing that warriors spawn left of the starting settler and most players will continue moving it left, you've just learned critical information about not only where this unit came from, but also where they are going.



In this case, they could've learnt that Portugal's warrior has come from the southeast, the exact direction that their own warrior is heading towards, through any combination of player comms, loyalty overlay, or seeing the trajectory of the warrior. They know that Portugal has +1 sight, so they could've thought that by going in the same direction, there is a near zero chance to find any huts that the Portuguese warrior hasn't already taken.

And yet, the vast majority of players would just continue moving their warrior southeast like they've been doing for the past 8 turns.

If you're trying to maximize your early-game advantage by maximizing the number of huts you get (and granted, most players aren't even consciously attempting to maximize this), every time you receive information you need to fundamentally reconsider whether the trajectory your unit is on is still the optimal one given your new knowledge.

In this case, since it's still early in the game, you need to modify your warrior's trajectory so it isn't useless. In this case, because the Portuguese warrior is moving from SE to NW, you ideally want your own warrior to move perpendicular if you want to maximize your chances of revealing unexplored areas of the map, which means you need to change your warriors trajectory from SE to SW.

Often, this principle is most relevant when you meet other players' units early in the game. Because you can't monitor the movement of every other unit in real time, you'll need to keep a mental history of other players' units' movement to create a model of the trajectories each one is on, updating the trajectory as you reveal more information about their movements or intentions.

Another Side of "Don't Duplicate Work"

So far, we've talked about this principle in the context of constantly making adjustments to your units so they don't duplicate work that other players have already done.

However, it's equally, if not more important to consider how this concept applies to the work performed by your own actions and decisions throughout the game.

I'll shotgun some examples to illustrate this point.

If you know your settler will reveal tiles around a settle location with their vision, what is the point of sending your scout to reveal the surrounding area five turns earlier when they could reveal anything else on the map?

If you're about to establish suzerainty over a city-state, why would you scout the land around the city-state when you can reveal anything else on the map?

If you know your builders will come and improve a tile, why would you walk a scout onto that tile to reveal the same tiles five turns earlier when you can reveal anything else on the map?

Sometimes, you're in a situation where you're forced to duplicate work — for example, if you're at the end of a peninsula and all your scouts need to go through the same path. At this point, your position is unfortunately compromised due to RNG, but you can still try to maximize the potential for your scouts after they get out of the corridor.

Most players intuitively grasp the concept of not duplicating work and will wholeheartedly agree when presented with these ideas. However, their actual gameplay often reveals a stark disconnect between understanding and implementation. Instead of actively adjusting their unit movements and strategies whenever they reveal new information, they frequently fall into autopilot mode and continue executing on their previously-chosen suboptimal choices.

To truly excel, you need to be willing to adopt a more proactive approach. This means constantly reevaluating unit trajectories and scouting patterns with each new piece of information revealed. It's not enough to simply acknowledge these principles — they must be rigorously applied turn after turn, even when it feels tedious or unnecessary.

D — There Is No Danger

And if there is, you'll beat them down

This characteristic of AMMO may be more challenging to replicate, as it's partially based on reputation, partially on skill in other aspects of the game like warring, and partially on preparation before the game. However, the core principle is powerful and can significantly impact your gameplay.

The idea is simple: many players assume they'll be punished if they take actions like moving settlers without protection or neglecting to scout their neighbors' city strengths. Sometimes, especially for newer or weaker players, this assumption is correct, and they'll have to play around this.

Elephantguy says: Many strong players are teamers players, and they still have some teamers mindset when they come play FFA. In FFA I still escort my settlers with scouts and I try to scout my neighbors and see their city strength.

However, in my extensive experience, you don't need to worry about the average player in your game. I have never had my early-game strategy ruined by a random player stealing a unit from me. This observation opens up clear opportunities for greedy moves, such as moving settlers without protection or using builders to scout.

The current iteration of Civ 6 discourages aggression due to the overwhelming advantage that defenders have. I have confidence that in games where I'm attacked, I'll have enough of a skill advantage at war to defeat them, which in turn is a deterrent for other players.



In this game, a Mamluk rush from Arabia turns into an opportunity for me to pillage his land, which arguably results in me getting even further ahead in the game.



Another mid-game rush from another player results in failure as I fend them off and place 2nd in the game above the attacker.

The only instances where this approach has backfired are when faced with players who clearly intend to play irrationally for the sole purpose of griefing. While this does occur occasionally, it's usually very evident when it's going to happen. In such cases, you can take the additional step of choosing not to participate in lobbies with these players, as the game is unlikely to be enjoyable anyway.

By adopting this "There Is No Danger" mindset, you free up valuable resources and units for more productive tasks. Instead of wasting moves on unnecessary protection or scouting areas known to be explored, you can focus on exploring unrevealed areas of the map.

It's important to note that this strategy doesn't mean you should be reckless. Rather, it encourages you to make calculated risks based on the understanding that most players in a typical game are not looking to grief or irrationally attack in the early stages. This approach allows you to optimize your early-game strategy and potentially gain a significant advantage over more cautious players.

Remember, the fundamental principle of Civ 6 is compounding. By freeing up units and moves that would otherwise be used for unnecessary protection, you're creating more opportunities for growth and expansion, which can snowball into a substantial lead as the game progresses.

E — Prioritize Scout Buys

In the super-early-game of Civ 6, tile buys, if necessary, are generally the most high-value use of your gold. This prioritization stems directly from the fundamental principle of compounding advantages that we've discussed throughout this guide. An additional yield from an extra tile has an outsized impact on your empire's growth trajectory, and each additional yield in the first few turns can accelerate your entire game by shaving off turns from key milestones like your first settler or district.

However, in many games, I don't need multiple tile buys, if any at all, and therefore won't need to spend my early gold. Therefore, as soon as I accumulate 60 gold, I almost always buy a scout, unless there is an obviously better use of the gold, such as getting a hut and a camp and going from 55 to 100 gold, allowing you to buy a builder which will give you extra yields.

As we explained before, the earlier the scout, the more likely it is to find unexplored land, and the earlier we can start compounding off of flat rewards.

In reality, players will often buy other units like traders, or not even spend their gold at all as they're too busy dealing with other aspects of their game.

Warning — You Need The Whole Shebang

You've probably noticed this as you've been reading, but it's time to make it explicit. These five characteristics build off of each other and wouldn't make sense if you're missing one.

For example, to truly execute on no duplicated work, you need to have a willingness to use settlers when necessary to reveal tiles, which in turn requires you to play like there is no danger.

Or if you want to prioritize the tundra quickly, you need to be willing to forgo revealing the fog around your land and shift your gameplay to play more off other vision mechanics. And as you're prioritizing tundra, you don't want to duplicate work by sending your units through the same path or moving in the same direction in the tundra.



A player who knows a lot about duplicating scouting work.

2 — Prepare For The Metagame

Uncovering CPL's failure and my attempt to fix it

Back in June of 2023, as I was creating a leaderboard for Falcon's 2v2 tournament, I got deep into TrueSkill as the right choice for ranking algorithm. As I continued working with the algorithm, I noticed that CPL was using a default configuration for TrueSkill that is entirely suboptimal for Civ 6 FFA. I'll walk you through the details here because this document also happens to be my platform for finally influencing some meaningful positive change in CPL.

In these examples, we'll use a 2-player FFA (a "duel") just for illustration, but this generalizes to any number of players (above one, of course).

In an ELO-based system, the outcome of a match is determined entirely by the two ELOs of the players. The winning player will win X points, and the losing player will lose the same X points.

However, in a TrueSkill-based system, there are additional parameters. Some are extra parameters on an individual's skill (e.g. Sigma, which is a parameter to show the remaining variance/"uncertainty" in the player's skill). But the one we care about is a global TrueSkill parameter called Beta. Beta is the "distance in skill (μ) that guarantees about 76% chance of winning.

In CPL, the Beta parameter is set to an absurdly low number, around 200. If I have 2400 rating and I play UnderTheGun who has 2200 rating, I am expected to win 76% percent of the time. This is an absurd expectation set by this TrueSkill configuration — if I place above him, I get X points. If I place under him, I get $-3X$ points. If you know UTG, you'd know it's pretty much impossible for me to beat him 76% of the time.

In reality, the configuration for Beta should be set closer to 500-600 rating points. But, given that it's closer to 200, the provably optimal strategy then becomes playing in lobbies where other players are substantially lower skill than you.

I approached Cisco about this as he was responsible for maintaining the TrueSkill integration, we got on a call, and I walked him through how the current system was misconfigured and potential ways to address it. We agreed that I should create a presentation on the topic to present to the CPL Admin team.

Unfortunately, when I asked Under about the suggestion a few weeks later, he said there was no internal interest to make any changes to the existing system, and I was forced to drop it.

TL;DR: CPL made farming to be the optimal FFA strategy

Since there was no change made by the CPL moderating team, I decided to play the game they incentivize playing, which is to play with lower skilled players. This decision, while driven by the flawed rating system, has had an unexpected benefit: it has allowed me to refine AMMO into something that is consistently strong in these types of lobbies.

Playing in lobbies with lower-skilled players has provided a unique opportunity to isolate and analyze the impact of each component of AMMO. This “laboratory” environment has been crucial to fine-tuning the strategy and understanding its nuances.

For example, the “Starting Units Beeling Tundra” component of AMMO becomes particularly powerful in these lobbies. Lower-skilled players are less likely to contest tundra regions early, due to lack of knowledge, anxiety about their neighbors, or otherwise. This allows for more consistent execution of this strategy and clearer observation of its benefits.

Similarly, the “Don’t Duplicate Work” principle becomes even more critical, as the inefficiencies of other players make the gains from this approach more apparent.

The “There Is No Danger” mindset also shines in these lobbies. Lower-skilled players are less likely to punish greedy early-game moves, especially if they know you are a more skilled player, allowing for a more extreme application of this principle. In fact, this

has helped me understand the limits of how far this mindset can be pushed before it becomes detrimental, which I've found comes down to barbarians and griefers.

It's important to note that AMMO will still provide an advantage in higher-skill lobbies, but is likely less pronounced and less consistent. In these games, more players know about these principles, such as knowing the tundra has more rewards, although they may not be executing against this knowledge to the extreme that I've been doing.

I also realize that once this guide comes out, AMMO may not be that effective anymore. The main benefits of AMMO come from the information asymmetry, where I've realized the value of certain aspects of the game and prioritize them to an abnormal extent compared to any other player. If every player in your game is replicating this, then AMMO probably becomes the suboptimal strategy.

A few more pre-game dials you should turn

In Part 1, I discussed some of the factors that make AMMO stronger or weaker. It turns out that many of these factors can be influenced before the game even starts, and that's what I've been doing.

Every game I ban Canada and Russia because those are two tundra-bias civs who can singlehandedly ruin the EV of my tundra rush.

I vote for Lakes and Rich Highlands because they have a large tundra band, and many players still apply their Pangea scouting habits to Lakes and Rich Highlands even though Lakes and Rich Highlands are much higher EV for tundra scouting.

The one exception to AMMO prioritization is when I pick Brazil, which I know will tend to spawn equatorial and therefore the tundra rush is weaker due to distance. However, the other sim bonuses of Brazil are so strong that I think they outweigh the downsides.

3 — Why AMMO Works: Secrets About Hut Generation

Disclaimer: While I had intuition around the patterns we'll be discussing in this section, I didn't have enough concrete information to formalize that into guidelines until actually conducting my own investigation during the writing of this guide.

Huts Cluster Predictably

On August 12, 2024, BBM v0.93 was released. One of its changes was to fix a bona-fide error in the Firaxis hut placement algorithm. However, this modification, which did fix the Firaxis bug, introduced a new bug which causes huts, particularly on Pangea, to cluster in predictable ways.

Here is the relevant code:

```
function CanPlaceGoodyAt(improvement, plot)

    local improvementID = improvement.RowId - 1;
    local NO_TEAM = -1;
    local NO_RESOURCE = -1;
    local NO_IMPROVEMENT = -1;

    if (plot:IsWater()) then
        return false;
    end

    if (not ImprovementBuilder.CanHaveImprovement(plot, improvementID, NO_TEAM)) then
        return false;
    end

    if (plot:GetImprovementType() ~= NO_IMPROVEMENT) then
        return false;
    end

    if (plot:GetResourceType() ~= NO_RESOURCE) then
        return false;
    end

    if (plot:IsImpassable()) then
        return false;
    end

    if (plot:IsMountain()) then
```

```

    return false;
end

-- Don't allow on tiny islands.
-- local numTiles = plot:GetArea().GetPlotCount();
-- if (numTiles < 3) then
--     return false;
-- end

-- Check for being too close to another of this goody type.
local uniqueRange = improvement.GoodyRange;
local plotX = plot:GetX();
local plotY = plot:GetY();
for dx = -uniqueRange, uniqueRange - 1, 1 do
    for dy = -uniqueRange, uniqueRange - 1, 1 do
        local otherPlot = Map.GetPlotXYWithRangeCheck(plotX, plotY, dx, dy, uniqueRange);
        if(otherPlot and otherPlot:GetImprovementType() == improvementID) then
            return false;
        end
    end
end

-- Check for being too close to a civ start.
for dx = -3, 3 do
    for dy = -3, 3 do
        local otherPlot = Map.GetPlotXYWithRangeCheck(plotX, plotY, dx, dy, 4);
        if(otherPlot) then
            if otherPlot:IsStartingPlot() then -- Loop through all ever-alive major civs, check if their
start plot matches "otherPlot"
                for player_num = 0, PlayerManager.GetWasEverAliveCount() - 1 do
                    local player = Players[player_num];
                    if player:WasEverAlive() then
                        -- Need to compare otherPlot with this civ's start plot and return false if a match.
                        local playerStartPlot = player:GetStartingPlot();
                        if otherPlot == playerStartPlot then
                            return false;
                        end
                    end
                end
            end
        end
    end
end

return true;
end

function AddGoodiesBBM(iW, iH)
    local NO_PLAYER = -1;
    print("-----");
    print("Map Generation - Adding Goodies BBM");

    --If advanced setting wants no goodies, don't place any.
    local bNoGoodies = GameConfiguration.GetValue("GAME_NO_GOODY_HUTS");
    if (bNoGoodies == true) then
        print("*** The game specified NO GOODY HUTS");
        return false;
    end
end

```

```

-- Check XML for any and all Improvements flagged as "Goody" and distribute them.
local iImprovements = 0;
local iTiles = 0;
for improvement in GameInfo.Improvements() do
    local improvementID = improvement.RowId - 1;
    if(improvement.Goody and not (improvement.TilesPerGoody == nil)) then
        for x = 0, iW - 1 do
            for y = 0, iH - 1 do
                local i = y * iW + x;
                local pPlot = Map.GetPlotByIndex(i);
                local bGoody = CanPlaceGoodyAt(improvement, pPlot);
                local result = 0;
                local goodyDensity = iTiles / iImprovements
                if (bGoody) then
                    if (iImprovements == 0 or (improvement.TilesPerGoody <= goodyDensity)) then
                        local goody_dice = TerrainBuilder.GetRandomNumber(2, "Goody Hut - LUA Goody Hut");
                        if(goody_dice == 1) then
                            ImprovementBuilder.SetImprovementType(pPlot, improvementID, NO_PLAYER);
                            iImprovements = iImprovements + 1;
                        end
                    end
                end
                if goodyDensity < improvement.TilesPerGoody then
                    iTiles = iTiles + 1;
                end
            end
        end
    end
end
print("-----");
end

```

At a high level, this algorithm scans through each row of the map from south to north. It keeps a running counter of the tiles per hut (called **goodyDensity**, but would be more accurately called **tilesPerGoody**), and every 128 tiles (on default 1x hut settings) after the previous hut was placed, it flips a coin to see if it should place a new hut.

It'll only place huts on valid locations, as indicated by **CanPlaceGoodyAt**, which checks for impassable terrain, huts too close to another hut, and huts too close to a player's spawn, among other things.

However, I noticed that one part in this code would lead to an uneven hut distribution.

```

if goodyDensity < improvement.TilesPerGoody then
    iTiles = iTiles + 1;
end

```

It turns out that this code was accidentally limiting itself from placing goody huts as it moved across the map.

The code uses two important numbers:

- How many suitable tiles it has checked (`iTiles`)
- How many goody huts it has placed (`iImprovements`)

It uses these to calculate how spread out the huts are (`goodyDensity`).

However, the code only counts a tile as “checked” if there aren’t many huts placed yet. Therefore, as more huts are placed, the algorithm thinks it has checked fewer tiles than it actually has, which means that the algorithm became less and less likely to place huts as it moves across the map. This caused more huts to be placed in the areas that the code has checked first, and fewer in areas it checked later.

Moreover, the algorithm is self-limiting — as it places more huts, `goodyDensity` tends to increase since `iTiles` grows more slowly than it should. This makes it increasingly unlikely for the condition `goodyDensity < improvement.TilesPerGoody` to be true, further exacerbating the problem as the scan progresses.

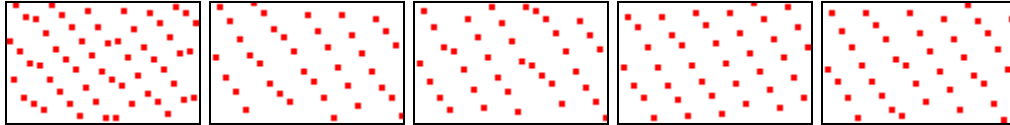
Simulations

In order to visually interpret the implications of this bug, we replicated the hut generation code in Python, including all Lua idiosyncrasies like division by zero resulting in `math.inf`.

Note that in these cases we did not simulate impassable terrain like mountains, or min distance from city-states and player spawn locations. If we did, the patterns in the center of the map would be more broken up.

We also attempted to simulate different hut densities of 128 and 85 tiles per hut (representing default hut distribution and 1.5x hut setting). These are randomly chosen for each image.

All Land



Ellipse



Left-Pinched Pangea



Right-Pinched Pangea



South-Pinched Pangea



North-Pinched Pangea



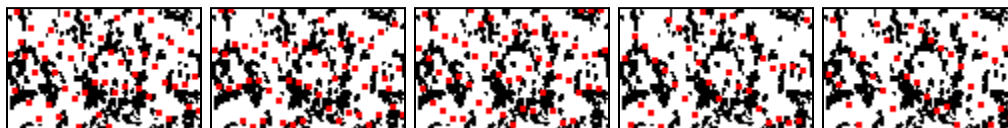
Sumeria Pangea (city-states and players simulated)



Sumeria Pangea Vertically Flipped (city-states and players simulated)



Lakes

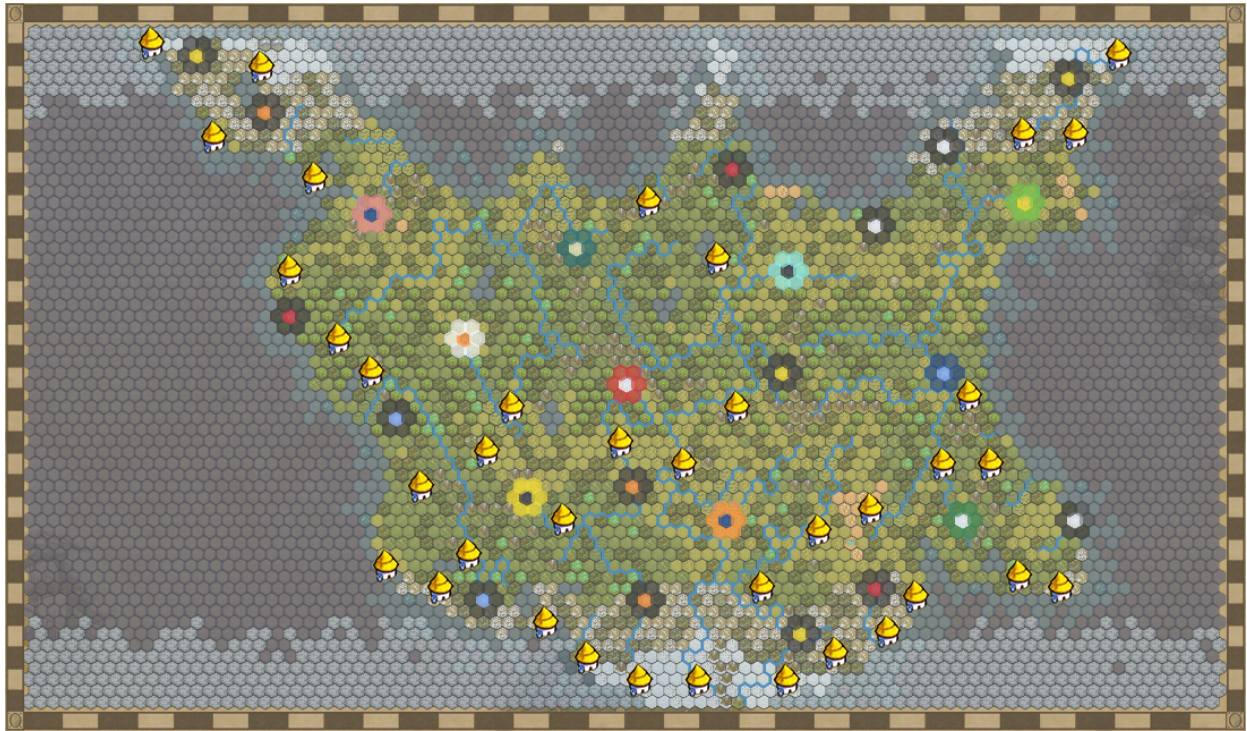


Exploitable Patterns on Pangea

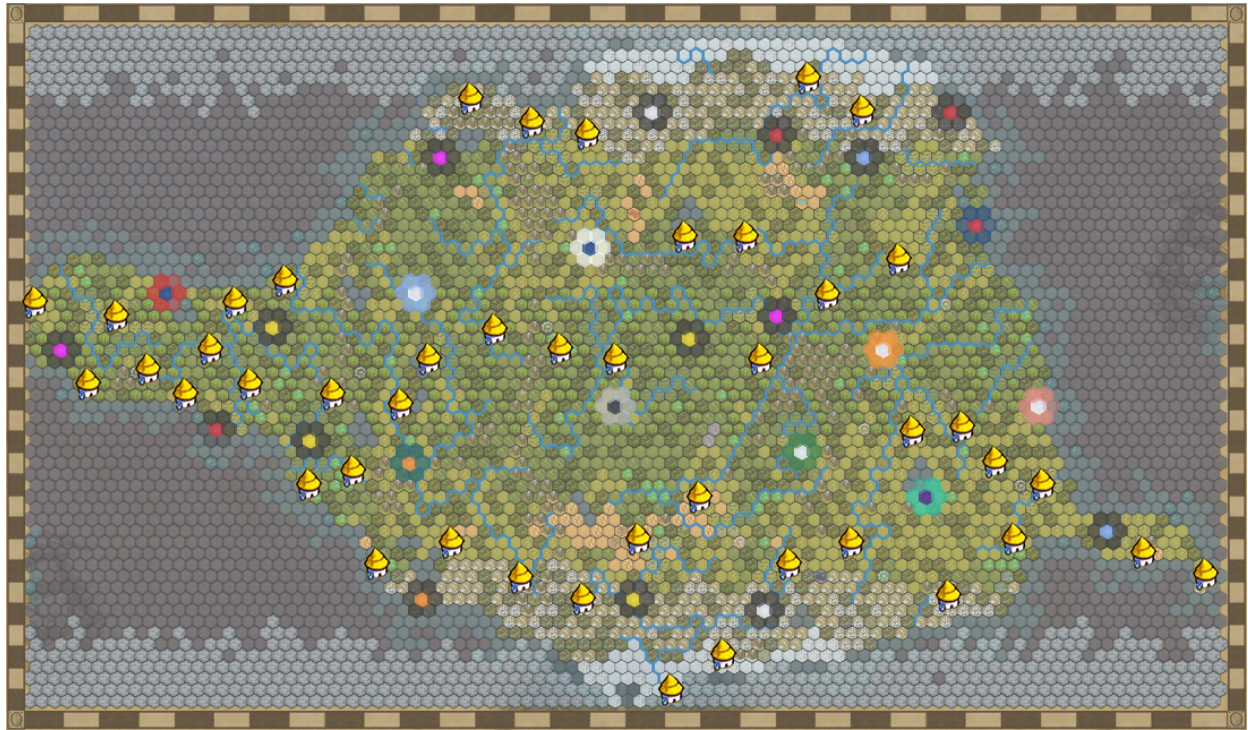
For someone with a computer science background, it should be pretty straightforward to understand how the huts will be distributed based on the logic in the code. However, these simulations should make it clear for the layman of the predictable patterns that will happen on Pangea maps.

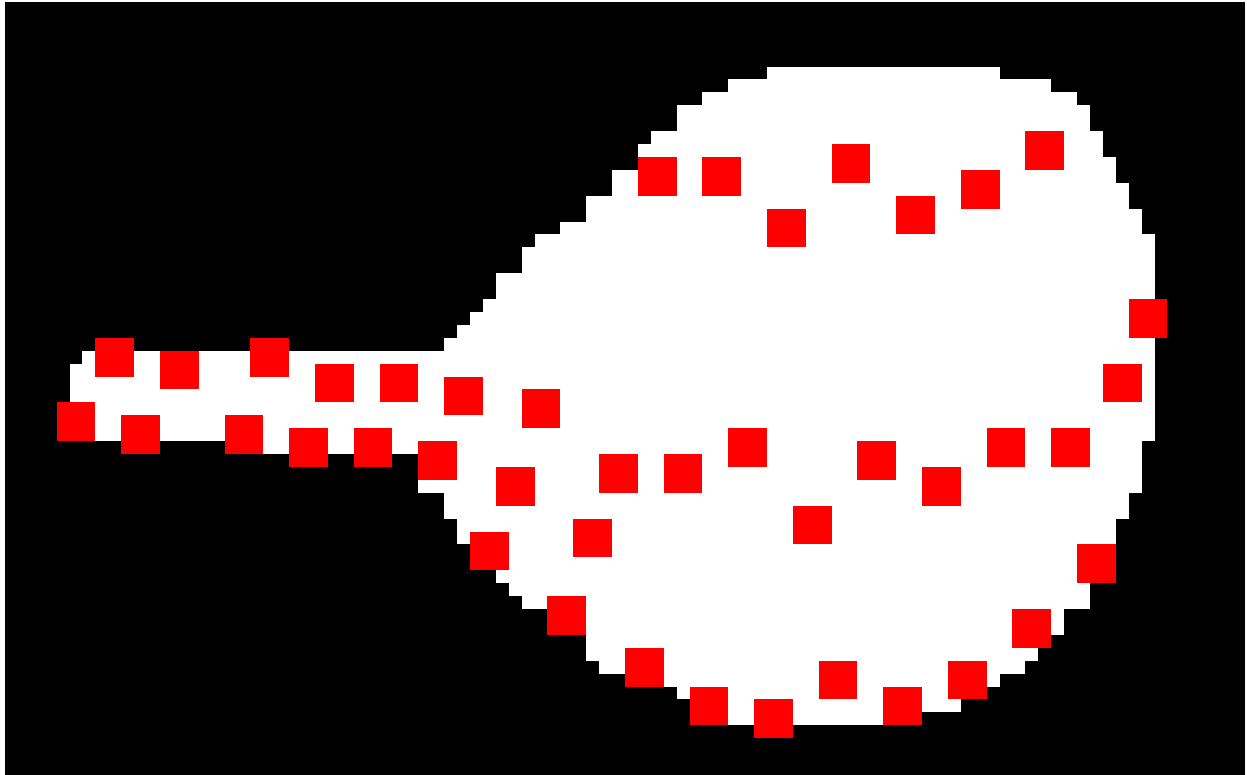
On Pangea, this algorithm results in erroneously high hut density at the south of the map, often with many huts close to the southern edge of the landmass. In cases where the Pangea narrows in the left or east direction (a left-pinned or right-pinned Pangea), huts are “overplaced” on the narrowed area. This only happens for left- and right-pinned Pangeas, not for north- or south-pinned Pangeas.

Let's compare this to some real-life examples.



In this Sumeria game that I played, you can see that the overall hut distribution is near-identical to the simulation.





In this Aztec game I played, you can also see how the huts have clustered onto the left-pinch of the Pangea, as well as some of the striations, in the actual game map. In the corresponding simulation, we didn't correct for city-states or player spawns, which would've broken up the linearity of the simulation's striations.

There are two ways to exploit this knowledge in-game, if you know you're playing Pangea.

1. Understand that not only are the tundras less contested, but the southern tundra specifically has an erroneously high number of huts, especially close to the bottom edge. Therefore, you should prioritize this area from turn 1.
2. If you see any evidence that the Pangea pinches into the west or east, you need to immediately pivot your efforts into scouting either the peninsula itself, or the southwest/southeast region of the "main" landmass, respectively.



Definitely focus on the pinched areas.

A Case Study on Lakes and Highlands

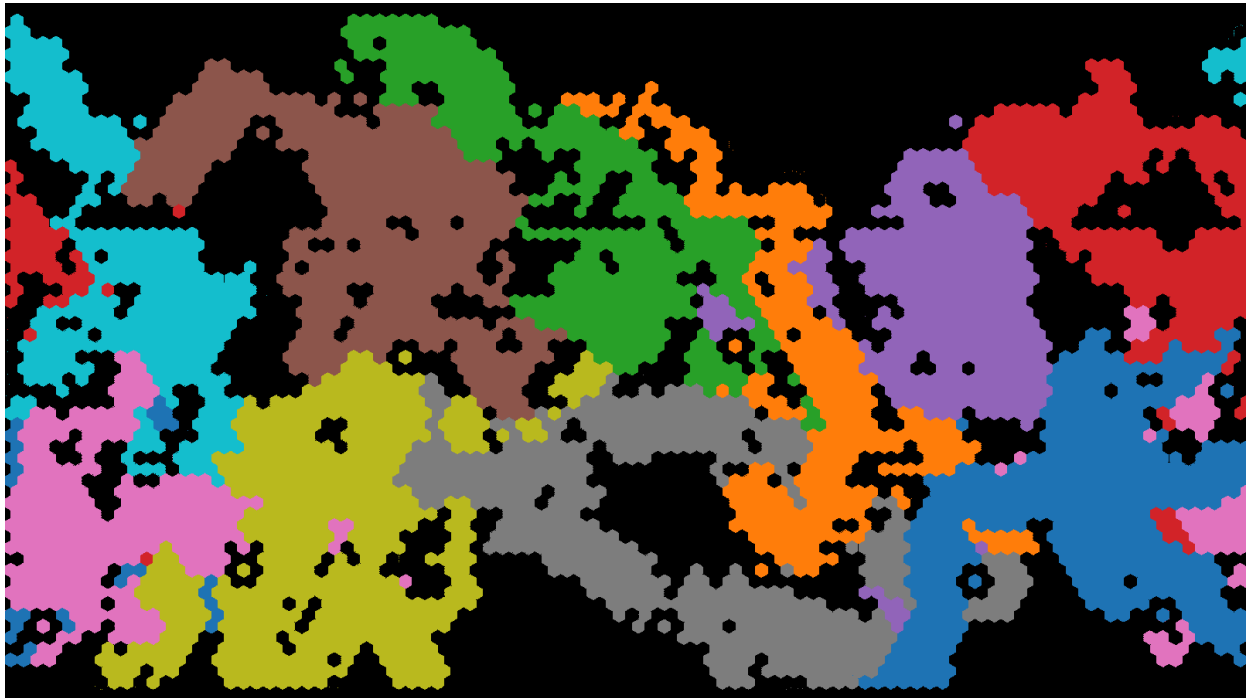
The All Land example is meant to show that without any impassable terrain or CS/players to break up the pattern, the huts form predictable striations. Even though the striations are predictable, for balance purposes we can still consider these huts (reasonably) uniformly distributed.

In the Lakes simulation, we use an actual map from a game I played, although it isn't corrected for CS or player spawns blocking hut placement. This shows less pronounced, but still predictable striations.

However, by knowing that the huts are more uniformly distributed, we can take advantage of the map through more conventional AMMO principles.

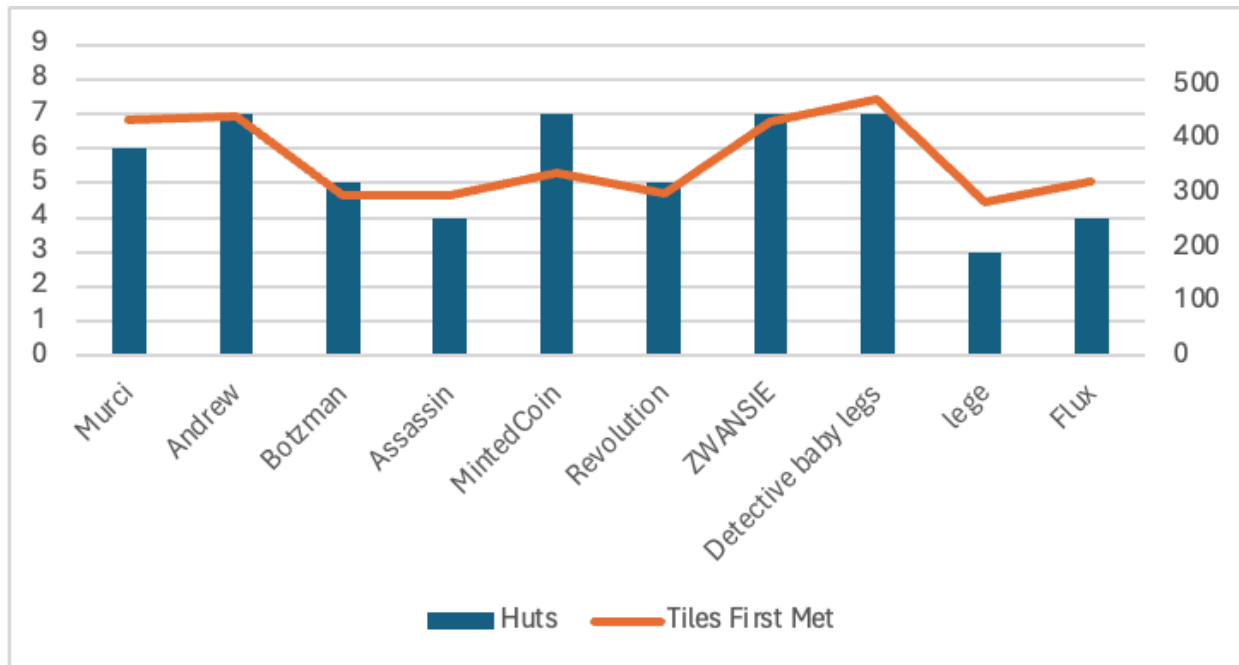
Assuming that there is no Canada or Russia in the game, every player will spawn outside of the tundra, in the middle 2/3rds of the map. Each tundra, representing approximately 1/6th of the map's height, won't have any players. Assuming you're reasonably close to the tundra, of the huts on the map that are closer to you than any other player, anywhere from 1/3 to 1/2 (and maybe even more) of them will be in the

tundra. Moreover, as we saw earlier in this guide, it is common for 80% of the city-states on the map to be located in the 1/3rd of the map that's tundra.

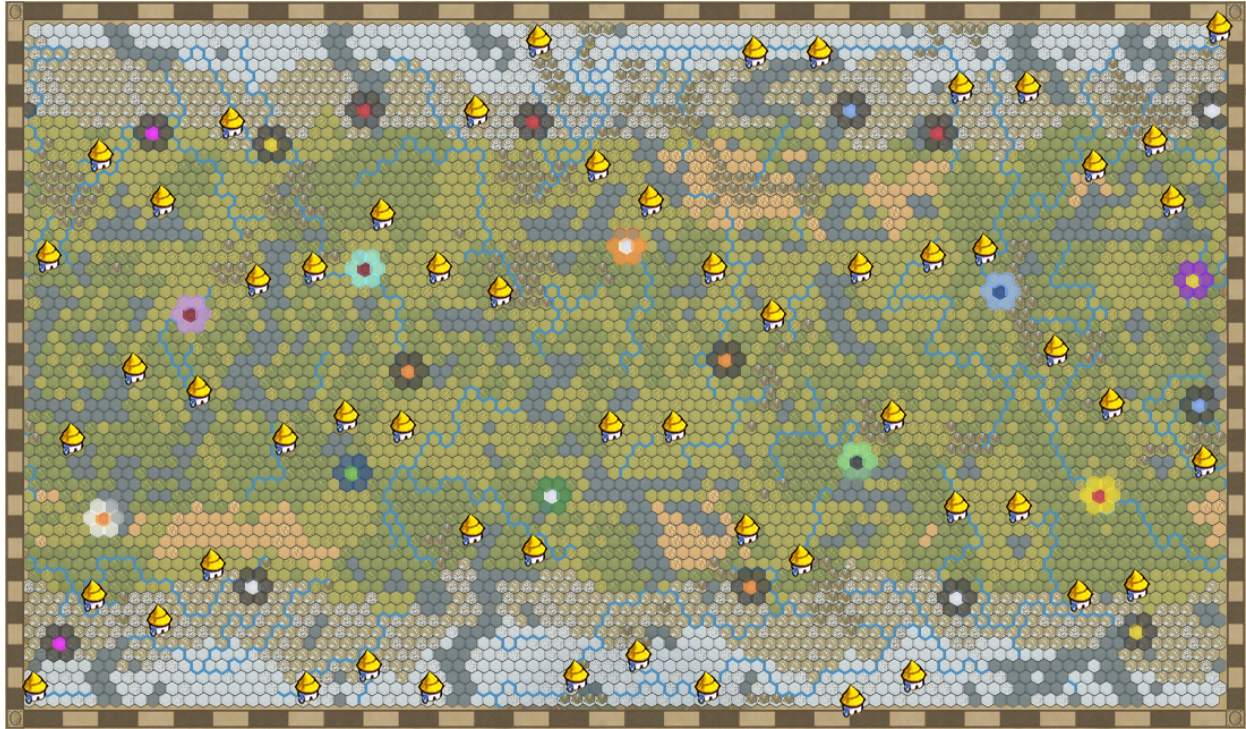


In this analysis, we evaluate the impact of scouting the tundra and first-meeting tiles on the number of huts a player obtains in a game. We colored the map based on which player first-met each tile. We corrected for coast and mountains, although we could not correct for other tiles that can't have huts such as resource tiles, tiles within a certain distance of player spawns and CS, and huts within a minimum distance of each other.

By taking the colored area after a certain number of turns, we can find the total number of tiles that each player first met, and then plot it against the number of huts they received that game.



What we see is that the number of tiles first met is a good predictor of huts found in a game, with some variation such as Lege with clear underperformance and MintedCoin with clear overperformance. The three players with the highest number of first met tiles, Andrew, ZWANSIE, and Detective Baby Legs, all sent scouts to, and first-met many tiles in, the southern tundra (blue, gray, and yellow on the visualization, respectively). And perhaps to no surprise, Detective Baby Legs, with the most tiles first met, was playing the only civ in the game with a bonus to scouting — Cree.



Those same three players were tied along with MintedCoin for the highest number of huts received that game. Looking at the hut map, this should be no surprise, as the southern tundra had over 50% higher hut density than the northern tundra.

What this shows is that the players who sent scouts to the tundra had, on average, 40% more tiles first-met than the players who sent their scouts into the middle of the map, or circled them around their land.

Moreover, the players who first-met the most tiles also found the most huts, with a clear correlation between the two.

It turns out AMMO works for other players as well.

4 — Case Studies with Recent Games

Due to page count considerations, this section has been split into a separate document.

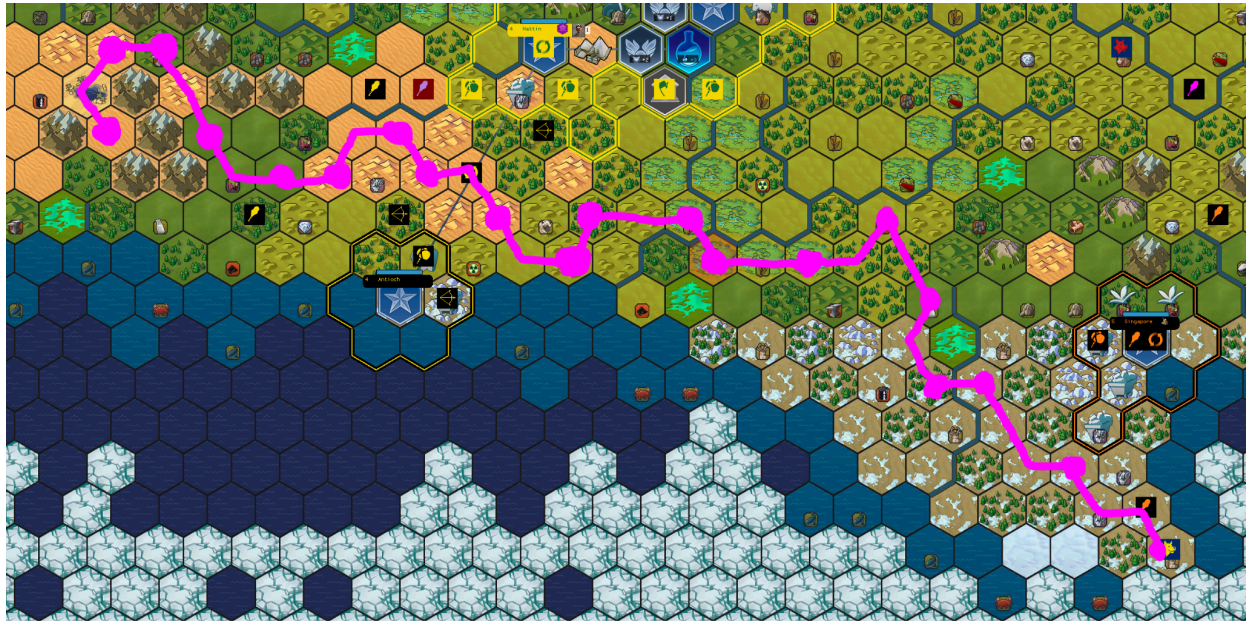
AMMO Case Studies with Recent Games

5 — The Low Rolls

Examples



In this Nubia game on 1x huts, I found two huts in the entire game with three scouting units (2 scouts, 1 warrior). Compare this to Herson, who has the only other VOD from the game. He found four huts with two scouting units (1 scout, 1 warrior).



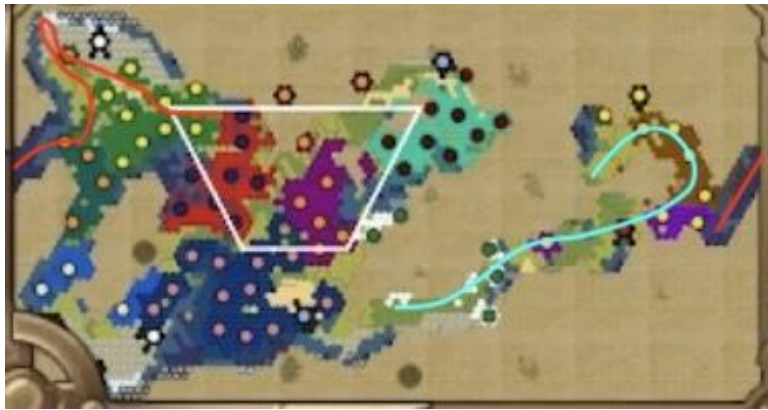
In this Babylon game, my scout enters this tundra late and therefore beelines the end of the tundra to find any unexplored huts. There were never any huts to begin with, and my scout runs straight into a dead end.



In this Ottomans game, my scout walks right by a blue CS and misses it completely. Player comms later in the game informs me of this fact, and I end up revealing it with another unit. Earth Satellite later reveals that this was the only blue city-state on the entire map.



In this Brazil game, my scout traverses the jungle, finds Canadian cities to the left and units to the north, and therefore heads back east while also going back deeper into the tundra. After 12 turns, my scout has beelined directly into a dead end. Note: when crossing the river, walking onto the hill would've revealed one more tile, but it may be slower by one turn depending on the unrevealed tile 3 tiles to the east of that hill.



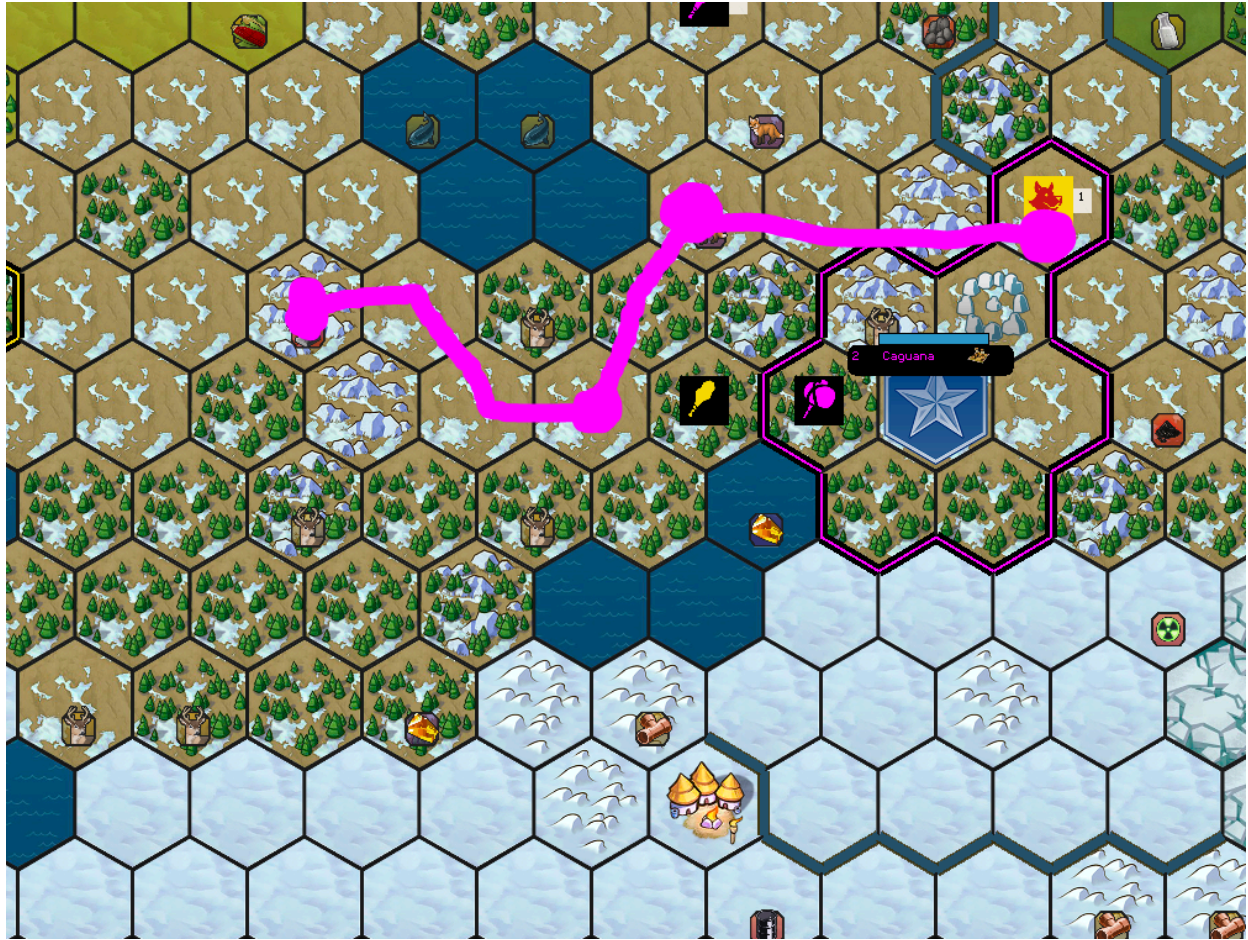
In this game, I've shown the trajectory of two relevant scouts. Note the orientation of their movement. A war declaration later in the game reveals that my scouts have both missed a blue CS, and in fact both have pathed away from it right before meeting it.



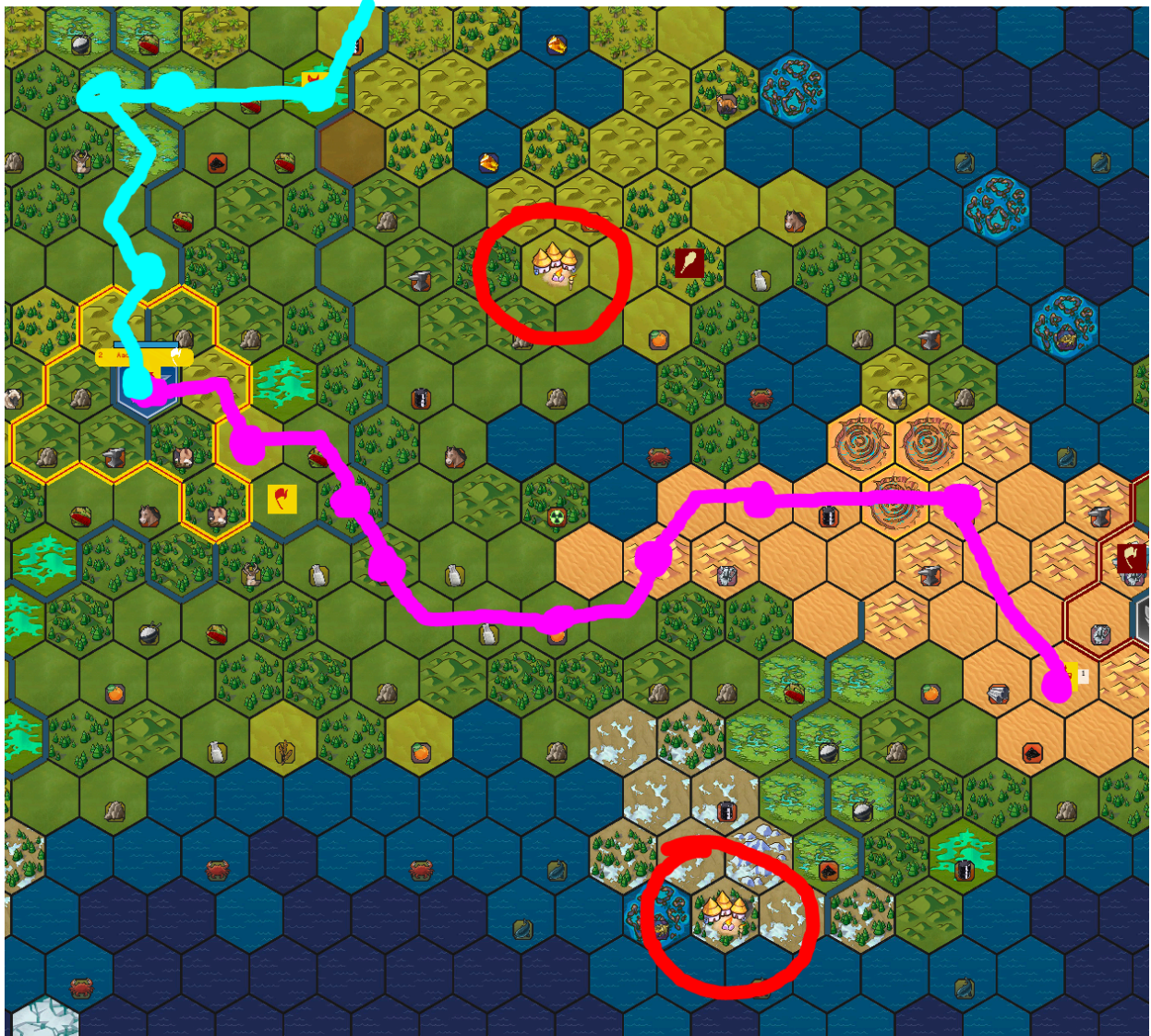
In the Season 2 FFA Finals, my scout beelines the tundra and spends nine whole turns finding nothing beyond a wonder that is not worth settling and will never be settled in the game.

Update: Oct 4 2024, this example is expanded upon in

[AMMO Clarifications and FAQs](#)



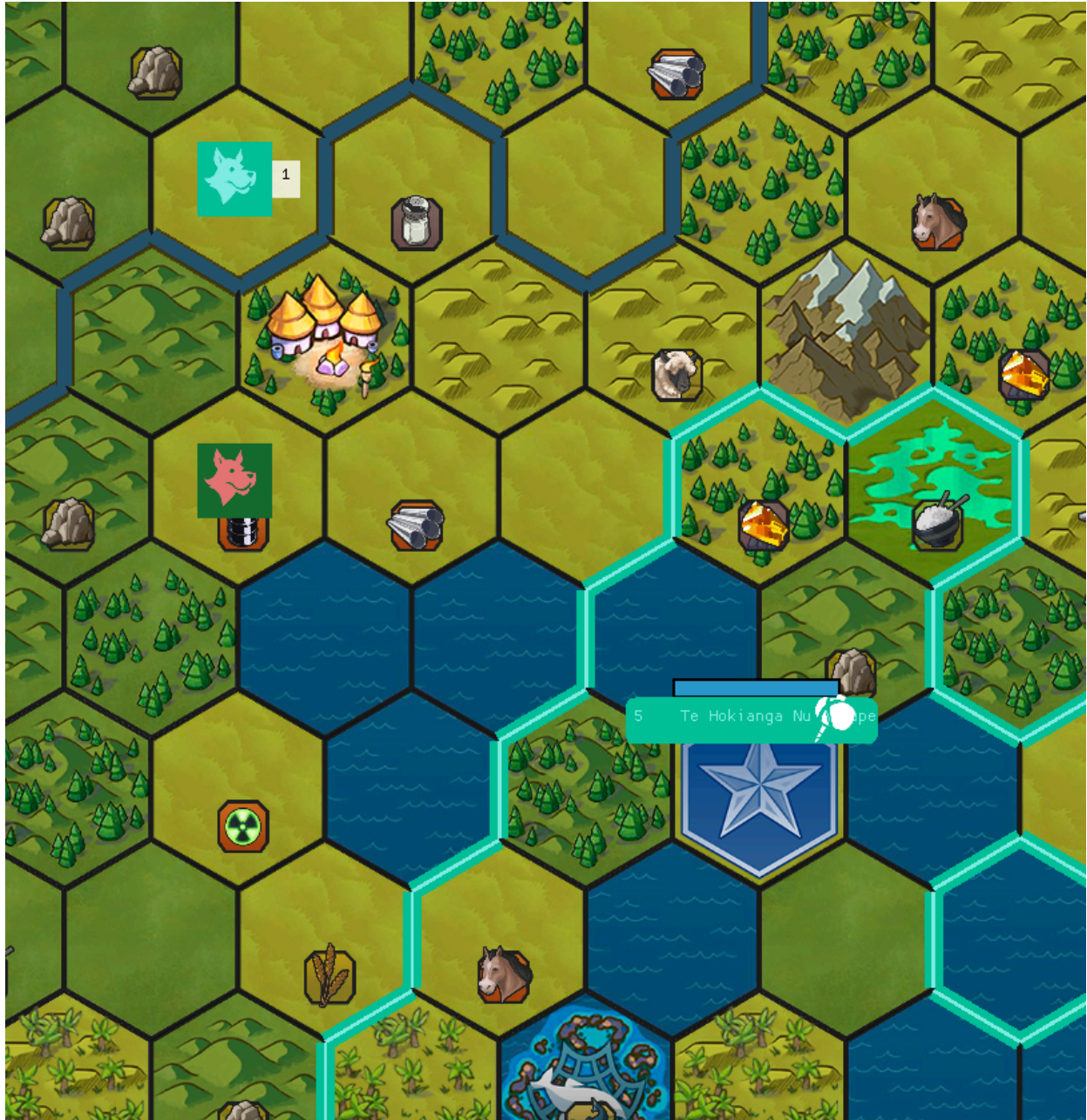
In this Germany game, my scout runs by a hut and I never revisit this area with another unit.



In another Germany game, there are two huts next to my capital that I never reveal. In fact, my scouts cannot path any further from either one of them.



In a different Brazil game, I got one hut in the entire game and would've missed golden if I didn't choose to go holy Brazil. 1x hut setting on Pangea.



In my Maori game, there is a minimum distance hut to my capital that I don't find until turn 21.

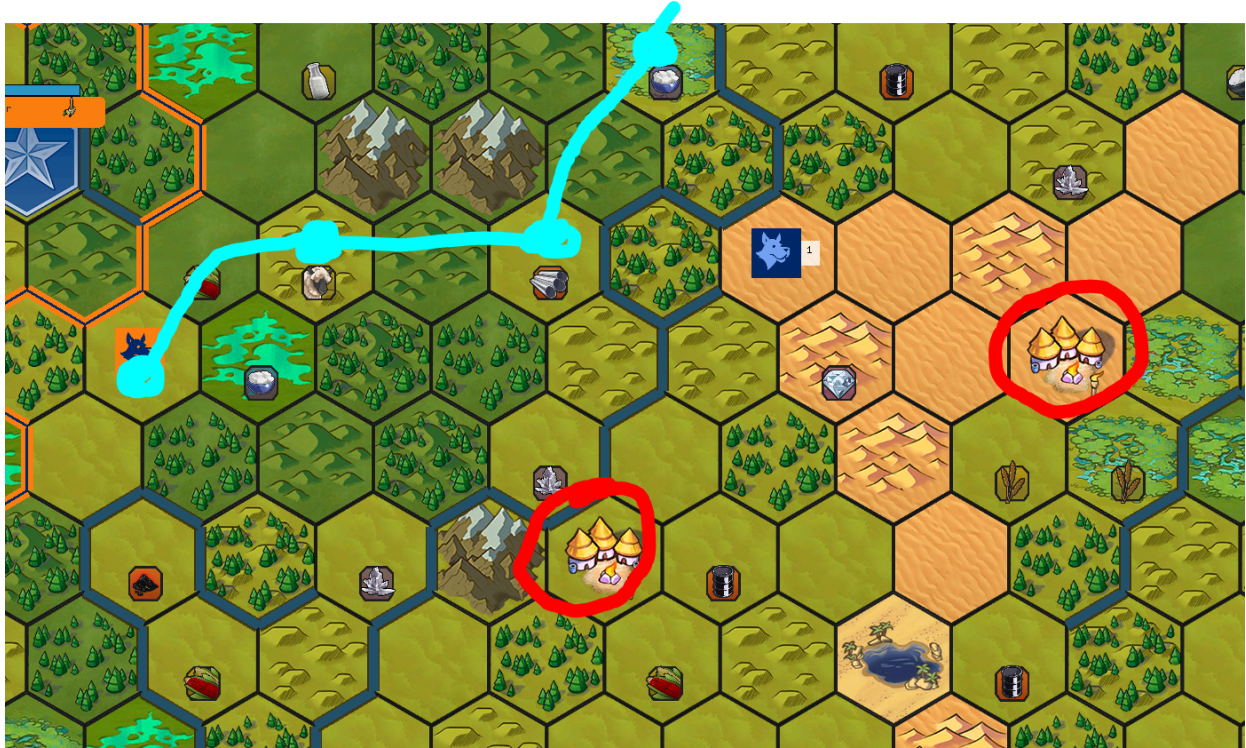


In the same game, there are also two huts close to my scouting builder that I never moved towards.



In this Aztec game, there was an eight turn Vesuvius settle from my cap. These are unimproved yields (7 food + prod, 5 stats), and this is better than a high-roll Torres (only 7 food + prod, no stats), Kilimanjaro (variable based on explosions but only +2 food compared to +5 stats), or high-roll Roraima (+3 science +3 faith on strongest tile), considered the three strongest wonders in the game. If I settled my B2 on the strong 3-1

base to the east of my capital (which is stronger than the B2 that I actually settled this game), I could've settled the Vesuvius city in four turns. Instead, the Vesuvius city is the very last city I settle this game because I don't find it until late.



In this Sumeria game, my scout paths directly away from two huts that are easily accessible.

Closing Remark

There are blatant instances of underperformance in every single game with saves available. In fact, I find it rather incredulous that anyone who has reviewed all of these games can claim that they cannot find any examples of underperformance.

Another top player feels the same way.

6 — Afterword: The Dangers of Cherrypicking

By Mr Toes

The first time I heard about the accusations against Andrew was when I joined a cpl channel where around 8 players were going through 1 of his vods. The main allegation here was a 1 charge builder scouting the tundra instead of improving the turtle.

Even tho 99% of CPL would've always improved the turtle, I didn't really find this convincing. What worried me was that almost everybody else was immediately convinced. Because then I remembered a game I played yesterday. In that game I walked my first settler blind into a mountain range and got incredibly lucky with an insane city.



Lets say a group of people released a 16 page document accusing me of map hacking, these same players in the channel would immediately remember this game from yesterday. Would they be convinced that I was cheating as well after seeing that screenshot?

These are the dangers of confirmation bias, a concept most CPL players are familiar with, but can still easily fall victim to. This becomes a problem when confirmation bias leads to cherry picking. Cherry picking is selecting the evidence that supports your theory and discarding evidence that does not support it. This often happens subconsciously and can cause the evidence to not represent the actual situation. Since there is a limited amount of data in the evidence it's hard to determine if it was selected objectively.