



POND WATER QUALITY

New pond syndrome is the classic way a first-season keeper loses koi, and it is almost entirely preventable. The pond looks finished — pump running, water clear, fish swimming — but the filter is still an empty box. For the first several weeks it cannot process what the fish put into the water, and the two things that build up in the meantime are both acutely toxic.

In short

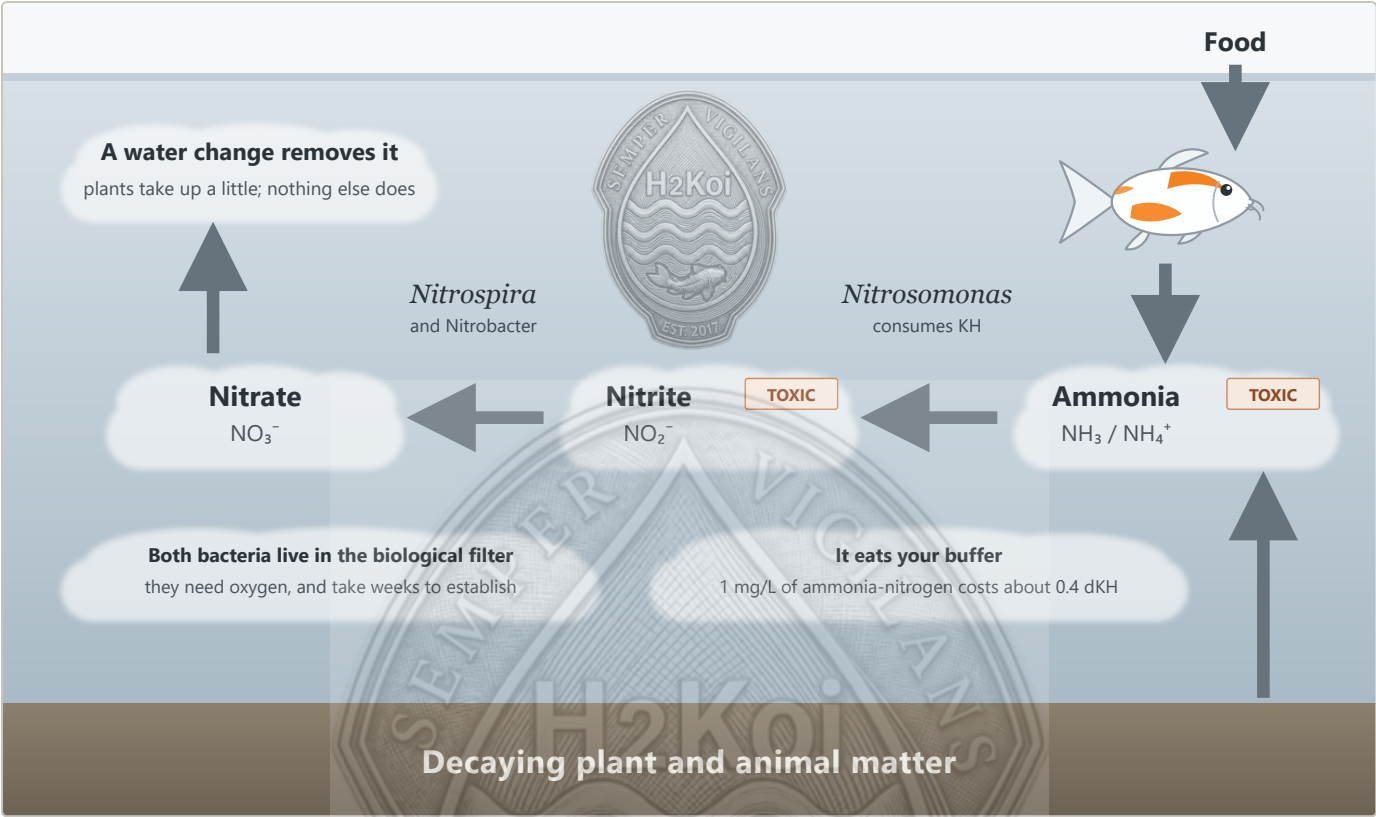
- Fish excrete ammonia. One group of bacteria converts ammonia to nitrite; a second converts nitrite to nitrate. They establish in that order, so a new pond shows an ammonia spike first, then a nitrite spike, and only then settles with nitrate slowly accumulating.
- Typically four to eight weeks, strongly temperature dependent. The bacteria work far more slowly in cold water, so a fall or winter start takes much longer than a summer one.
- Add very few fish at first and add more only slowly, feed lightly, test ammonia and nitrite daily through the spikes, and use partial water changes with dechlorinated water to hold the peaks down rather than to stop the cycle.
- Seeding the new filter with mature media, squeezings or water from an established system shortens it dramatically. A mature filter can be knocked back to square one by a tap-water rinse, over-cleaning, a power outage or certain medications.

What new pond syndrome actually is

Koi excrete ammonia continuously, mostly across the gills, and the more you feed the more of it there is. In an established pond that ammonia never accumulates, because two separate bacterial populations living on the filter media consume it: the first converts ammonia to nitrite, the second converts nitrite to nitrate. Nitrate is far less toxic and is managed by plant growth and [routine water changes](#).

A new filter has neither population. They arrive on their own — off the fish, out of the water, out of the air — but they take weeks to build to a working density, and they build in sequence. The ammonia eaters go first because ammonia is what is available first. The nitrite eaters cannot get going until there is nitrite for them to eat, which only happens once the first group is doing its job. That lag is the whole problem. A new pond has two toxic phases back to back, and the second one catches out keepers who believe they are through the worst of it.

The cycle runs in order, so the trouble comes in two waves



The cycle runs in order — and every step of it spends KH.

Reading the two waves correctly is most of the skill. If you only test ammonia, the pond will look like it has recovered right at the moment the second hazard is climbing. Test both, together, every time. Our companion guide on [ammonia and nitrite](#) covers the readings themselves in more depth.

PHASE	WHAT THE TEST KIT SHOWS	WHAT IT DOES TO KOI	YOUR MOVE
Ammonia wave	Ammonia climbing, nitrite at zero, nitrate at zero	Free ammonia burns gill tissue and irritates skin; fish go off food	Stop or cut feeding, partial water change, test daily
Nitrite wave	Ammonia falling back toward zero, nitrite now climbing	Nitrite crosses the gill and blocks the blood from carrying oxygen	Keep testing daily, water changes, hold a supportive salt level
Settled	Ammonia and nitrite both at zero, nitrate slowly rising	Normal processing; nitrate is the manageable end product	Add fish gradually, resume normal feeding, water changes for nitrate

Both intermediate stages are acutely toxic, not merely stressful. The fraction of total ammonia present as free ammonia (NH₃) rises sharply with pH and with temperature, so the same total ammonia reading in ppm (equivalently mg/L) is far more dangerous at pH 8.6 on a warm afternoon than at pH 7.4 at dawn. Nitrite is taken up across the gills and disables the blood's oxygen-carrying capacity, so fish can suffocate in water that tests perfectly well for dissolved oxygen. Gasping at the surface, sitting on the bottom, clamped fins, reddened gills and refusing food are all late signs. Test before the fish tell you.

How long cycling takes, and why a fall start drags

Four to eight weeks is the honest general answer, and temperature moves it more than anything else you control. Nitrifying bacteria divide slowly, and their metabolism tracks water temperature closely: warm water speeds them up, cold water all but parks them. A pond filled in June behaves very differently from the same pond filled in October.

Two other conditions matter while the filter is building. The bacteria are aerobic, so aeration and flow through the media are not optional. They also consume alkalinity as they work, which in soft water can pull down what US kits label total alkalinity and set up a pH crash partway through the cycle. Watch carbonate hardness alongside ammonia and nitrite, not after the fact.

WATER TEMPERATURE	PACE OF THE BACTERIA	WHAT IT MEANS FOR A NEW POND
75–85°F (24–29°C)	Fastest	A midsummer start generally lands at the short end of the four-to-eight-week window
65–75°F (18–24°C)	Brisk	Comfortable spring or early fall conditions; expect the middle of the range
55–65°F (13–18°C)	Slow	Expect the long end, and keep testing well past the point you think you are finished
Below 55°F (13°C)	Very slow	A late-fall or winter start can run well past eight weeks; keep stocking minimal and feeding down accordingly

Cycling safely with fish in the pond

The goal is not to avoid the cycle. It is to keep the peaks low enough that nothing is harmed while the bacteria catch up. Five habits do almost all of the work.

1. Stock very lightly at first. A few small fish in a pond built for a dozen adults is the whole trick. Each addition is a fresh ammonia load, so add more only slowly, and only once ammonia and nitrite have both read zero for a stretch.
2. Feed lightly. Food in is ammonia out. Through the spikes, feed a fraction of what you would normally, and skip days entirely when ammonia is high. Koi tolerate short fasts far better than they tolerate a gill burn.

3. Test ammonia and nitrite daily. Not weekly, and not only when something looks wrong. A liquid reagent kit is the reference; test at the same time of day so the numbers are comparable.
4. Use partial water changes to cap the peaks. When a reading climbs, dilute it — a 25 to 50 percent change with dechlorinated water is a normal response. This slows the cycle a little; it does not stop it, because the bacteria live on the media and not in the water column. Always dechlorinate.
5. Leave the filter alone. No rinsing, no back-flushing beyond the mechanical stage, no shutting the pump off overnight. You are farming bacteria, and they need continuous flow and oxygen.

Seeding the new filter from a mature system

Nothing else shortens a cycle as dramatically as borrowed bacteria. If you can get media, filter squeezings or even a few buckets of water from a healthy established pond or a dealer's system, you are transplanting a working population instead of waiting for one to appear.

Practical points: move seeded media wet and get it into the new filter the same day, since these bacteria die quickly when they dry out or sit without oxygen. Take from a system you would be happy to buy fish from, because you are moving whatever else lives in that water too, and quarantine practice still applies. Bottled starter cultures vary widely in how much they help; treat one as a possible head start, never as a reason to stock heavily or to stop testing.

Salt while nitrite is climbing

Chloride competes with nitrite for uptake at the gill, which makes a supportive salt level genuinely protective during the second wave, while the nitrite-consuming bacteria catch up. The well-established supportive range is roughly 0.1 to 0.2 percent — about 0.8 to 1.7 pounds of pure, additive-free salt per 100 gallons (1 to 2 kg per 1,000 liters) — and the only sound way to run it is to measure rather than to calculate from a bag.

Salt does not evaporate. It leaves only in the water you take out, so repeated dosing without measuring stacks up quietly. Dissolve it fully in a bucket rather than throwing it in, re-dose only for the volume actually replaced at a water change, and verify with a salinity meter or a hydrometer. Some medications and treatments change in toxicity in salted water, and many pond plants object well below these levels, so check both before you add anything on top.

Old pond, new syndrome: what takes a mature filter down

An established pond is not permanently safe. The bacterial population is a living film on the media, and several ordinary events can strip it back far enough that the pond runs an ammonia spike all over again — sometimes within a day or two. This is why an experienced keeper with a five-year-old pond can still be caught out, and why any of the events below should be followed by a week of daily testing.

WHAT HAPPENED	WHY THE FILTER STALLS	BETTER PRACTICE
Media rinsed in chlorinated tap water	Chlorine and chloramine kill the bacterial film on contact	Rinse only in pond water, in a bucket drawn from the pond
Over-cleaning	Scrubbing or replacing too much media at once removes the population faster than it regrows	Clean gently, one chamber at a time, weeks apart
Flow stopped — power outage, pump failure or a vacation shutdown	The bacteria are aerobic; standing media goes anoxic and dies back within hours	Restore flow promptly; after a long outage, test daily and feed lightly
Medications and some treatments	Several pond treatments suppress or kill nitrifying bacteria as a side effect	Read the label for filter effects, treat in a separate vessel where practical, test through and after the course

What H2Koi does and does not do during a cycle

H2Koi is continuous early warning from industrial-grade sensors. It measures ammonium (NH₄) and nitrate (NO₃) directly along with temperature, pH, dissolved oxygen, conductivity and turbidity, with ORP available as an option, and it derives NH₃, nitrite, carbonate hardness on a 0-20 dKH scale, salinity, TDS. A self-cleaning wiper keeps the sensors clear. General hardness (GH) is not reported at all.

During a cycle that combination is genuinely useful: you see the ammonia wave building overnight rather than at the weekend, you see the derived nitrite start to move as the second population comes online, and you see alkalinity being consumed before it turns into a pH problem. What it will not do is diagnose disease or parasites, tell you why a filter stalled, or prevent anything on its own. It tells you sooner; you still make the call.

While a pond is actively cycling, use the continuous readings to see how the trend is moving, and act on the number in front of you before you change feeding, dose salt or start a water change.

We also build bespoke automated water changes, which is a natural fit for the drip-and-dilute part of this problem. We have never found another system that does it, and neither have our clients.

Why spot-checking leaves a gap

Testing once on Saturday morning is a snapshot of one moment in a week that contains 168 of them. During a cycle, the pond moves inside that gap. Ammonia rises after every feed and through the night; free ammonia tracks the daily pH swing, so the same total ammonia is at its most dangerous in the late afternoon when

photosynthesis has pushed pH up and warmed water has raised the toxic fraction. A Saturday-dawn test can read reassuringly low while Wednesday at 5 p.m. was not.

The nitrite wave is worse for spot-checking, because it can start and climb between two weekly tests while ammonia is falling and everything appears to be improving. Continuous monitoring does not replace the kit. It tells you which day to reach for it, and it turns two weeks of guessing into a trend you can actually read.

Questions keepers ask

How long does it take to cycle a new koi pond?

Typically four to eight weeks, and temperature is the main variable. A pond filled in warm summer water tends toward the short end; one filled in the fall, with water in the 50s Fahrenheit, can run well past eight weeks because the nitrifying bacteria are barely working. The cycle is finished when ammonia and nitrite both read zero for several consecutive days while the fish are being fed normally — not when the water first looks clear.

Can I put koi in a new pond right away?

You can, but only a very few, and only if you are prepared to test daily and feed lightly for the next two months. The fish are what starts the cycle, so some load is necessary, but a full stocking on day one is the single most reliable way to lose fish to new pond syndrome. Add the rest gradually, one small group at a time, and only after ammonia and nitrite have held at zero.

Ammonia is zero but nitrite is high — what is going on?

That is the normal second half of the cycle and it means the first bacterial group is working. Ammonia is being converted as fast as the fish produce it, but the population that consumes the resulting nitrite has not caught up yet. Keep feeding light, keep testing daily, dilute with partial water changes, and hold a supportive salt level for chloride protection until nitrite returns to zero. It usually clears within one to three weeks in warm water, longer when it is cold.

Do bottled bacteria starters actually work?

Results vary a great deal by product, storage and age, so treat a bottle as a possible head start rather than a guarantee. Mature media, filter squeezings or water from a healthy established system are far more reliable, because you are moving a living population that is already thriving in pond conditions. Either way, the honest test is your ammonia and nitrite readings, not the label.

Should I do water changes while the pond is cycling?

Yes, when the readings call for it. The bacteria colonize the filter media, not the water column, so a 25 to 50 percent change dilutes the toxin without removing the population you are trying to grow. It may extend the cycle slightly, and that is a good trade against a gill burn. Always dechlorinate, and match temperature reasonably closely so you are not adding thermal shock to a stressed fish.

How much salt protects koi from nitrite?

A supportive level of roughly 0.1 to 0.2 percent is the well-established range for chloride protection against nitrite, which is about 0.8 to 1.7 pounds of pure, additive-free salt per 100 gallons (1 to 2 kg per 1,000 liters). Dissolve it before adding, measure with a salinity meter or hydrometer rather than trusting the arithmetic, and remember that salt only leaves in the water you remove, so top up for the replaced volume only. Check any medication you are also using, since some interact.

My pond is years old — why do I suddenly have an ammonia reading?

Something has knocked back the bacterial film. The usual culprits are media rinsed in chlorinated tap water, an over-enthusiastic filter clean, a pump or power failure that left the filter standing without flow for hours, or a treatment that suppressed nitrifying bacteria. Any of these can send an established pond straight back to an ammonia spike. Treat it exactly like a new cycle: cut feeding, test ammonia and nitrite daily, dilute the peaks, and reseed with mature media if you can get some.

