Water Storage Planning Worksheet — Island Sage Farm

Prepared collaboratively by Kara & Claude (Anthropic) · August 8, 2026

What changed in this version

Replaced individual water rates by species/category, since a young cork oak, a mature-native willow, and a dormant saffron corm have almost nothing in common water-wise. Also added rabbits, Dexter cattle, and confirmed Finn sheep don't need a different rate class than the general sheep table.

How this worksheet works

Standard rainwater-harvesting sizing method: total dry-season demand, minus what your roofs will actually catch during that same window, plus a safety margin, equals the recommended storage capacity.

Sheet by sheet

Assumptions — dry-season length and safety margin, shared by every other sheet.

Livestock — chickens, sheep (Finn), geese, pigs, rabbits, Dexter cattle.

Perennials, Garden & Fungi — every planting category you listed, each with its own rate and source. This replaced the old single "garden acre" line and is far more accurate to what's actually going in the ground.

Household — people living on-site.

Catchment Supply — what your roofs will actually collect during the dry months (still needs your real roof area).

Storage Summary — pulls everything together into one recommended tank capacity.

Legend

Blue text on light-blue fill = your input — change these to match your farm.

Black text = calculated — don't overwrite.

Yellow highlight = key result.

Important caveats

• This models potable/gravity-fed tank storage only — not the future gleying pond (Part 4) or the dew/fog collector array (Part 3), both real but non-potable, weather-dependent water sources not counted here.

• Every rate is a published range, not a single fixed number. Several rows below (elderberry, raspberry, roses) don't have strong extension-level sourcing for exact gallons — those are flagged as general estimates rather than sourced figures, and are the ones most worth adjusting based on your own observation once plants are in.

• This is a planning estimate. Update it as real data comes in from your AcuRite station and actual usage.

Sources used for the default rates in this worksheet

• Livestock (sheep, swine, cattle): NDSU Extension AS1763, "Livestock Water Requirements," rev. Feb 2026.

• Rabbits: MSU Extension "Rabbit Tracks: Feeds and Feeding" (doe + litter ~1 gal/day); general rule of 1–2 oz water per lb body weight/day used to derive a per-head range for a mixed 3-dozen herd.

• Chickens: FarmCalcs livestock water guide (6–9 gal/100 layers/day controlled rate), widened for real-world use.

• Geese: Feathered Farm Life — ~1 gal/goose/day drinking rule of thumb (excludes bathing water).

• Fruit trees (young): OSU Extension "Growing Tree Fruits and Nuts at Home" — 3–5 gal/tree/week.

• Chestnut (seedling): Tree Journey — ~1 gal/week for newly planted seedlings, declining after ~2 years.

• Cork oak: no cork-oak-specific extension figure found; treated as a young-tree establishment rate, with a note that mature cork oak (native to dry-summer Mediterranean climates, same as saffron) will want less water than a typical PNW planting once established — a good candidate to reduce in future years.

• Willow: general young-tree/shrub establishment sourcing plus horticultural consensus that willows are comparatively water-loving; widened upward vs. other species. McKenzie/curly willow (larger forms) split from dwarf blue willow (shrub form) since mature size differs substantially.

• Grapes (young vine): Montana State University Extension (WARC) and University of Minnesota Extension — 5–10 gal/vine/week for vines in their first two seasons.

• Blueberries/huckleberries (young): synthesized from multiple horticultural sources citing 1–2 gal/week for young plants up to 9–13 gal/week once mature and fruiting heavily; low end used given all plants are 1–3 years old.

• Elderberry, roses, raspberry canes: general estimate based on comparable young shrub/cane establishment rates — not independently sourced per species. Flagged for you to correct from observation.

• Saffron crocus: multiple horticultural sources (Roco Saffron, Epic Gardening, Sativus.com) confirm the corms go fully dormant and should NOT be watered from roughly June through September — watering during summer dormancy risks bulb rot.

• Vegetable garden and herb bed: standard 1 in/week ≈ 0.62 gal/sq ft/week rule of thumb (Iowa State, NC State, UC Marin); herb-bed rate reduced to reflect the mostly Mediterranean/drought-tolerant species in your list.

• Mushroom logs: Northern Woodlands and Field & Forest Products growers' guides — logs need regular light watering (weekly, to keep the bark from drying) plus periodic full submersion (12–36 hrs) to force fruiting; blended into one planning rate since the routine watering and the averaged, staggered force-soak both draw on the same supply.

Shared Assumptions

Assumption	Value	Notes / source
Length of dry season (days)	120	Default = June through September (~4 months).
Safety margin	20%	Added on top of the bare-minimum gap between demand and catchment.
Household backup fraction still drawn from catchment	15%	Added Aug 8, 2026 — well funding secured. 0% = fully well-supplied, no rainwater backup for the house. 100% = same as before (well not yet relied on at all). Default set to 15% as a standing insurance margin — covers a well-pump failure, a power outage on the off-grid system, or a bad water test — rather than zero. Two things worth resolving before dropping this all the way to 0%: (1) Puget Sound island aquifers below sea level carry a documented seawater-intrusion risk from over-pumping near shorelines (WA Dept. of Ecology, Island County groundwater studies), requires new well's water tested (chloride/conductivity) before treating it as bulletproof; (2) drilling/permitting/pump/testing takes time — household still needs catchment coverage until the well is actually online.
Livestock backup fraction still drawn from catchment (not well)	100%	Added Aug 8, 2026. Kept at 100% by default — deliberately NOT reduced by the well. Per permaculture / resilience / regenerative-ag approach ("sink it, spread it, store it"), catchment/pond stays the primary source for livestock; the well is reserved for household plus occasional emergency top-ups (in PNW, use of pump-truck-during-drought to fill water storage tanks is backup until pond infrastructure is in place), not routine irrigation/livestock draw — over-drafting a well for farm use risks it running dry unpredictably, which is harder to recover from than a dry cistern. Lower this only to model a specific emergency pump-truck or well-assist scenario, not as a permanent planning assumption.
Garden/Perennials/Fungi backup fraction still drawn from catchment (not well)	100%	Same logic as the livestock fraction above — kept at 100%, catchment/pond stays primary for irrigation. This matches your stated view that well-fed irrigation is generally discouraged in regenerative practice, since it lets the operation overbuild past what the catchment/pond system can actually sustain, with a well failure being unpredictable and hard to recover from mid-season.
These five cells feed every other sheet.		

Livestock Water Demand

Edit the blue cells (head count, and the low/high gal-per-head-per-day range if you want to override the defaults).

Animal	Head count	Low gal/hd/day	High gal/hd/day	Avg gal/hd/day	Daily total (gal)	Dry-season total (gal)	Source / notes
Chickens (up to 100)	100	0.06	0.50	0.28	28.0	3,360	Low end = extension-measured drinking-only rate for laying hens (6–9 gal/100 birds/day). High end widened for real-world pastured/backyard use including spillage, cleaning, and hot-weather intake.
Finn sheep (up to a dozen)	12	1.00	3.00	2.00	24.0	2,880	NDSU AS1763 Table 4: pregnant ewes 1.0–2.0 gal/day, lactating ewes 2.0–3.0 gal/day. Breed doesn't change this table — it's organized by weight and production stage, not breed. Finn sheep run smaller-framed than many wool/meat breeds but are famously prolific (triplets+ litters common), so a nursing Finn ewe feeding a large litter should be planned toward the HIGH end of the lactating range even though she's a smaller
Geese (2 dozen)	24	1.00	1.50	1.25	30.0	3,600	~1 gal/goose/day drinking rule of thumb (Feathered Farm Life); high end for hot weather. Does NOT include bathing/splash water, which geese want regularly — best met from the future pond, not counted here.
Pigs (up to 4)	4	3.00	6.00	4.50	18.0	2,160	NDSU AS1763 Table 5: finishing hogs 2–3 gal/day, widened upward for hot-weather wallowing (pigs cool themselves with water since they can't sweat). Pond access once built will offset much of this.
Rabbits (3 dozen)	36	0.08	0.20	0.14	5.0	605	General guideline of 1–2 oz water per lb body weight/day for an average ~8–10 lb meat rabbit, widened for hot weather and nursing does (MSU Extension notes a doe + litter can drink about 1 gal/day combined, which is close to the high end of this per-head range once litters are factored in across the herd).
Dexter cattle (2)	2	8.00	12.00	10.00	20.0	2,400	Dexter is a small breed — mature cows typically 700–900 lbs vs. 1,000+ for standard beef breeds. Rate interpolated from NDSU AS1763 Table 1 for the 800–900 lb weight class at 60–80°F; push toward the high end if either animal is lactating.
TOTAL — Livestock						15,005	

Perennials, Garden & Fungi — Water Demand

Broken out by what you're actually planting rather than a generic acreage figure — young establishing trees, drought-tolerant Mediterranean species, water-loving

A — Trees, vines & shrubs (per-plant weekly rate)

Plant	Count	Low gal/plant/wk	High gal/plant/wk	Avg gal/plant/wk	Weekly total (gal)	Dry-season total (gal)	Source / notes
Fruit trees (apple, apricot, pear, fig, mulb	24	3.0	5.0	4.00	96.0	1,646	OSU Extension young-tree rate. All 1–3 years old, so full establishment rate applies to the whole group.
Chestnut trees	24	1.0	2.0	1.50	36.0	617	Tree Journey: ~1 gal/week for seedlings; upper end allows for the 2–3 yr olds in the group.
Cork oak	24	1.0	3.0	2.00	48.0	823	No cork-oak-specific figure found — treated as standard young-tree establishment. Native to dry-summer Mediterranean climate (same origin as saffron), so once past the 2–3 yr establishment window, these should need LESS water than a typical PNW planting, not more — a good line to reduce in future seasons.
Willow — curly & McKenzie (larger form	7	5.0	8.0	6.50	45.5	780	Willows are comparatively water-loving; rate set above standard young-tree default. McKenzie willow in particular can grow into a substantial tree and wants consistent moisture.
Willow — dwarf blue willow shrubs (5 tot	5	2.0	4.0	3.00	15.0	257	Same water-loving tendency as other willows but much smaller mature size, so scaled down from the larger-form willow rate above.
Grape vines	3	5.0	10.0	7.50	22.5	386	Montana State (WARC) & University of Minnesota Extension: 5–10 gal/vine/week for vines in their first two growing seasons.
Blueberries & huckleberries	24	1.5	3.0	2.25	54.0	926	Synthesized from multiple sources citing 1–2 gal/week for young plants (vs. 9–13 gal/week once mature and fruiting heavily). All plants are young, so the low end of the overall published range is used.
Elderberry shrubs	8	2.0	4.0	3.00	24.0	411	General young-shrub estimate — not independently sourced for elderberry specifically. Worth correcting once you have direct observation.
Roses (2 shrub, 2 tree, 4 climbing)	8	2.0	4.0	3.00	24.0	411	General estimate for young roses; climbing and tree forms toward the higher end given more top growth to support. Not independently sourced per rose type.
Raspberry canes	27	1.0	2.0	1.50	40.5	694	General young-cane estimate (midpoint of your 24–30 range used for count). Raspberries want consistent moisture but have a small root footprint per cane.
Subtotal — Section A						6,951	

B — Beds & garden (per-sq-ft weekly rate)

Bed	Sq ft	Gal/sqft/wk	Efficiency ×		Weekly total (gal)	Dry-season total (gal)	Source / notes
Saffron crocus	200	0.00	100%		0.0	0	Corms go fully dormant roughly June–September and should get NO water during that window — multiple sources warn overwatering during summer dormancy causes bulb rot. Rate set to 0 deliberately; this is the correct answer, not a placeholder. Corrected to 200 sq ft Aug 8, 2026 (the duplicate 500 sq ft mention was the typo).
Vegetable garden	200	0.62	70%		86.8	1,488	Standard 1 in/week ≈ 0.62 gal/sq ft/week rule of thumb. Efficiency multiplier (70% = a 30% saving) assumes drip/mulch; raise to 100% if hand-watering or overhead sprinkling with no mulch.
Herbs & flowers	100	0.35	100%		35.0	600	Rate set below the standard vegetable-garden rate to reflect your listed mix: thyme, sage, tarragon, chives, lavender, rosemary, oregano, coriander, and summer savory are all drought-tolerant Mediterranean-type herbs needing little supplemental water once established. Mint, comfrey, hostas, honeysuckle, and annual cutting flowers are considerably thirstier — if those dominate the bed rather than the drought-tolerant herbs, raise this rate toward the 0.5–0.62 vegetable-garden level.
Subtotal — Section B						2,088	

C — Mushroom logs (per-log weekly rate)

Item	Count	Gal/log/wk			Weekly total (gal)	Dry-season total (gal)	Source / notes
Mushroom logs (turkey tail, shiitake, reis	60	2.0			120.0	2,057	Blended planning rate combining (a) routine weekly moisture to keep bark from drying (~0.5–1 gal/log/week per growers' guides) and (b) an averaged share of the periodic 12–36 hr full-submersion soak used to force fruiting, staggered across the 60-log batch rather than all soaked at once. Much of the soak-tank water is reusable across multiple logs and can be reused for garden watering afterward rather than being truly consumed — treat this as a conservative (high) planning figure, and lower it once you see actual usage on your own soak-tank setup.
Subtotal — Section C						2,057	
TOTAL — Perennials, Garden & Fun	11,097						

Household Water Demand

Item	Value	Notes / source
Number of people on-site	1	Currently 1 person full time on-site, so this drives the live numbers throughout the workbook. See the comparison table below for the future WWOOFer scenario (up to ~3 people) side by side, without needing to change this cell.
Gal per person per day	50	35–50 gal/day = conservation-minded off-grid; 62.5 = documented PNW rainwater-catchment design (San Juan Island); 80-100+ = typical U.S. on-grid household. 50 is a reasonable working default here.
Days in dry season	120	Linked from Assumptions sheet.
TOTAL — Household dry-season de	6,000	

Scenario comparison (reference only — doesn't change the live number above)

Scenario	People	Household demand (gal, before well backup)
Current — just you	1	6,000
Future — with WWOOFers	3	18,000

Both scaled by the same well-backup fraction (Assumptions sheet) as the live figure above.

Dry-Season Catchment Supply

What your roofs will actually deliver into storage during the dry season.

Item	Value	Notes / source
Total collecting roof area feeding storage (sq ft)	1,425	UPDATED Aug 8, 2026 with real numbers: greenhouse two eaves confirmed at 12.5 ft x 33 ft each = 825 sq ft combined (from the NW/SE roof-slope geometry worked out this session). Hoop house footprint estimated at 20 ft x 30 ft = 600 sq ft combined, split across its north/south gutter runs — this one is still using the Master Reference's own estimate, since exact hoop house dimensions remain marked "confirm from kit spec" (Part 2.1). Total: 825 + 600 = 1,425 sq ft.
Dry-season rainfall total (inches)	5.0	Rough default from local climate normals for a June–Sept window. Your own WRCC KSHN Airport data or the on-site AcuRite station will be more accurate.
Collection efficiency	80%	Accounts for evaporation, first-flush diversion (WISY filters), gutter overflow, splash-out. 75-85% is standard for a well-built gutter/filter system.
TOTAL — Dry-season catchment supply (gal)	3,551	
(Uses 0.623 gal per sq ft per inch of rain.)		

Storage Sizing Summary

Item	Gallons	Notes
Livestock dry-season demand	15,005	From Livestock sheet, scaled by the livestock catchment-primary fraction (Assumptions) — 100% by default
Perennials, Garden & Fungi dry-season demand	11,097	From Perennials/Garden/Fungi sheet, scaled by its catchment-primary fraction (Assumptions) — 100% by default
Household dry-season demand	900	From Household sheet, scaled by the well-backup fraction on the Assumptions sheet
TOTAL dry-season demand	27,001	
Dry-season catchment supply	3,551	From Catchment Supply sheet — fill in your real roof area first
Raw deficit (demand − supply)	23,450	Floored at zero.
Safety margin	4,690	% set on the Assumptions sheet
RECOMMENDED STORAGE CAPACITY (gal)	28,140	
≈ number of 275-gal IBC totes	103	
≈ number of 55-gal barrels	512	
Category breakdown, for reference		
Livestock share of demand	56%	
Perennials/Garden/Fungi share of demand	41%	
Household share of demand	3%	
For comparison		
Your currently planned build-out (Master Reference Part 9) is two 4-tote IBC lines (4 x 275 gal x 2 = 2,200 gal) plus two 5-barrel lines (5 x 55 gal x 2 = 550 gal) = roughly 2,750 gal at full build-out, phased in as budget allows.		
Once the gleying pond (Part 4) is holding water, it becomes a major additional dry-season buffer — especially for cattle/pig drinking and wallowing, and possibly irrigation — on top of the potable tank capacity recommended above. Not counted here since it isn't built yet and won't be potable-quality even once it is.		

Your Planned Tank Capacity vs. Recommended

Item	Qty	Size (gal)	Subtotal (gal
Greenhouse tanks (NW eave + SE eave)	2	1550	3,100
Hoop house south — IBC totes	5	275	1,375
Hoop house north tank	1	1550	1,550
TOTAL — planned tank capacity (gal)			6,025
Recommended storage capacity (from above)			28,140
Coverage — planned capacity ÷ recommended			21%
Gap — recommended minus planned (gal)			22,115
Reference: full household demand if no well backup at all (100%)			6,000
Note: this compares your planned tanks against whole-farm demand (household + livestock + all plantings), since that's how the model above is built. In practice this tank system doesn't have to cover 100% of that on its own — the dew/fog collector array (Part 3) and, eventually, the gleying pond (Part 4) are additional water sources not counted in this worksheet at all. A more apples-to-apples comparison, if you think of this catchment as primarily serving the greenhouse/hoop house growing areas, is against the Perennials, Garden & Fungi demand line alone (row 5 above) rather than the whole-farm total.			
Planned capacity vs. Perennials/Garden/Fungi demand alone			54%

1-Person (current) vs. 3-Person (future WWOOFers) Comparison

Item	1 person (current)	3 people (future)
Household demand (scaled by well-backup fraction)	900	2,700
TOTAL dry-season demand	27,001	28,801
Raw deficit (demand − supply)	23,450	25,250
RECOMMENDED STORAGE CAPACITY (gal)	28,140	30,300
Your 6,025 gal planned capacity covers	21%	20%
Both columns use the same livestock and garden figures — only household changes. The gap between them is entirely the extra WWOOFer household draw, so it's a good gauge of how much slack you actually need before bringing on help.		