

Intel Corporation Restore Water Goal 2017 Annual Report

Prepared for Intel Corporation

February 2018



BONNEVILLE
ENVIRONMENTAL
FOUNDATION

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Introduction

Water is essential to Intel's semiconductor manufacturing process. As such, Intel has invested significant resources in innovative conservation efforts for decades. Intel's multifaceted water strategy has three main objectives:

- **Conserve** the amount of water used in their operations;
- **Collaborate** on water initiatives with our local communities; and
- **Create** technology solutions to help others reinvent the way they use and conserve water.

Today, Intel treats and returns approximately 80% of the water the company uses to local communities and watersheds through ongoing partnerships with municipalities and innovative reuse strategies. For the last several years, Intel has been working to understand how to do more and broaden this impact beyond their four walls. In 2017, Intel announced their commitment to **restore 100% of global water use by 2025**. This report describes this commitment, 2017 progress, and priorities for the future.

Intel's Restore Commitment

Intel has committed to restore 100% of the company's global water use by 2025 through support of collaborative projects that restore water in quantities equivalent to the water that Intel consumes.¹ To achieve this ambitious goal, Intel is engaging local community groups, and nonprofit and conservation organizations to identify and participate in projects that benefit local watersheds. These projects aim to address local water issues and support the well-being of communities, economy and the environment.

Project Selection Process

Intel initially considers a range of project types and filters them based on a set of criteria. Essential project criteria include:

- Credible partner with proven project development record and capacity
- Located in local source watershed (or tie to water supply)
- Feasible timeline and ability to contract in desired timeframe
- Long-term or permanent benefit (i.e., able to deliver benefit for multiple years)

Other criteria include the opportunity to leverage other funding, favorable cost benefit, tangible social benefit, potential to catalyze/scale up water solutions, community and employee engagement.

¹ <https://www.intel.com/content/www/us/en/environment/intel-and-the-environment.html>

Benefit Quantification Approach

Restore water benefits are based on peer-reviewed quantification methodologies (Rozza et al., 2013) previously developed by LimnoTech in collaboration with The Nature Conservancy (LimnoTech, 2017). The type of restore water benefit calculated and the quantification methodology applied varies by project type, and depends on the project objectives, the activities implemented, and the information and data available to support the calculation. It is recognized that the estimated benefits have some uncertainty. To reduce this uncertainty, scientifically-defensible methodologies and conservative assumptions are employed in the quantification process, in combination with available data and information.

Consistent with the established replenish methodologies, restore water benefits are counted in the year the project was completed. Restore water benefits for completed projects will continue to be reported in each subsequent year, provided that the project is maintained and continues to function as intended. Ongoing project performance verification is provided by the project partner, where appropriate.

In situations where there are multiple project funders and Intel funds cover less than 100% of the project cost, the restore water benefit is adjusted to reflect Intel's portion of the total project cost (cost share). For projects where investments were made before Intel's involvement (e.g., land acquisition), the total project cost is estimated based only on investments made after Intel's involvement in the project.

Quantification Results

In 2017, Intel funded seven projects located in Arizona (3), Utah (1), California (1), Oregon (1), and Vietnam (1). Work to implement these projects is underway, but restore benefits will not be reported until the projects are completed and benefits are being generated. Therefore the focus of this 2017 Annual Report is to describe the projects that have been funded to date. Preliminary benefits presented below will be updated after the projects have been completed.

Overall Progress for 2017

During 2017, Intel invested in seven projects in collaboration with The Nature Conservancy (INC), Arizona Land and Water Trust, Trout Unlimited, World Wildlife Fund (WWF), Vanasche Farm and National Forest Foundation (NFF). Figure 1 shows the distribution of 2017 funding for projects benefiting three priority states in the US and one project in Vietnam. Preliminary calculations indicate that when complete, these projects will contribute toward **Intel's global goal by 18%**.

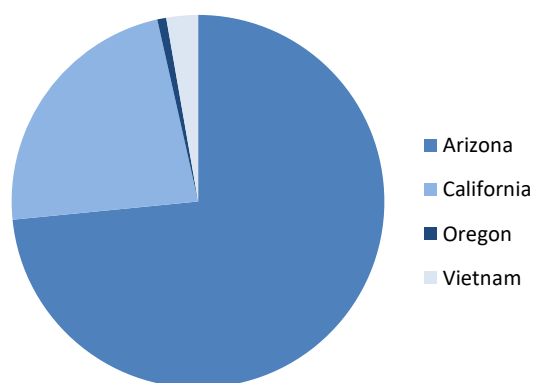


Figure 1. 2017 Project Funding

Project-Specific Results

The locations of Intel’s current projects are shown in Figure 2. Details regarding these projects are provided in Table 1, followed by descriptions of each project.

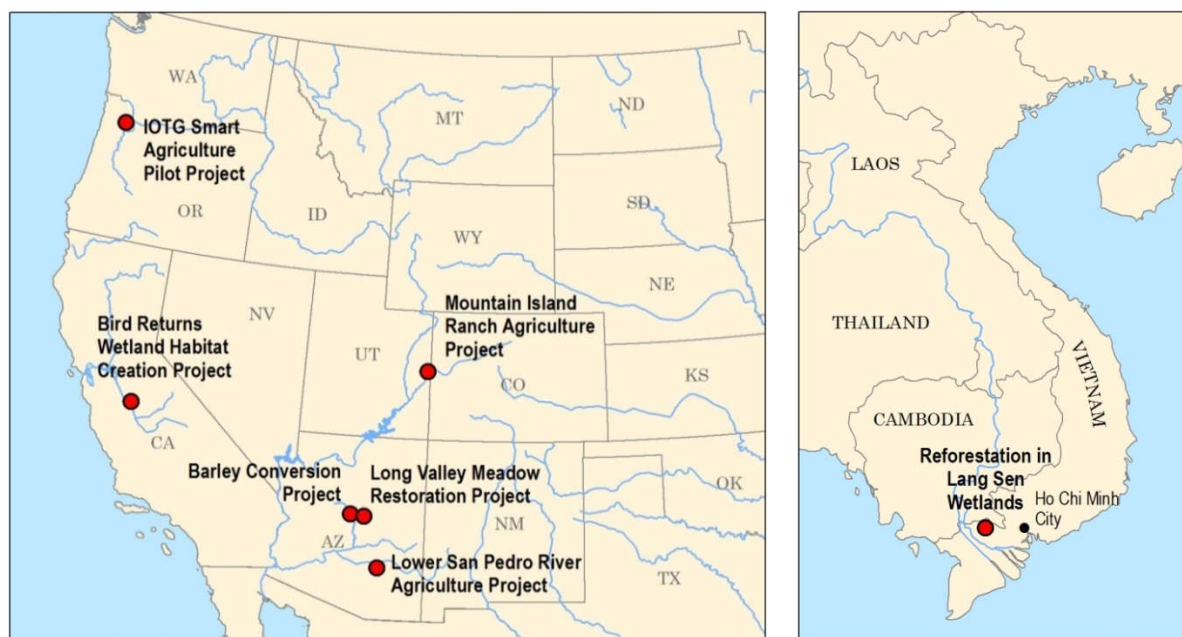


Figure 2. Project Locations

Table 1. 2017 Funded Projects

State/ Country	Project Name	Implementing Partner	Activity	Preliminary Restore Benefit (MGY)
AZ	Mountain Island Ranch Agriculture Project	Trout Unlimited	Crop conversion; irrigation efficiency	142
AZ	Lower San Pedro River Agriculture Project	Arizona Land and Water Trust	Crop conversion	62
AZ	Barley Conversion Project	The Nature Conservancy	Crop conversion	60
AZ	Long Valley Meadow Restoration Project	National Forest Foundation	Wet meadow restoration	20
CA	Bird Returns Wetland Habitat Creation	The Nature Conservancy	Wetland habitat creation	47
OR	IOTG Smart Agriculture Pilot Project	Vanasche Farm	Smart irrigation	TBD
Vietnam	Reforestation in Lang Sen Wetlands	World Wildlife Fund	Reforestation	< 1

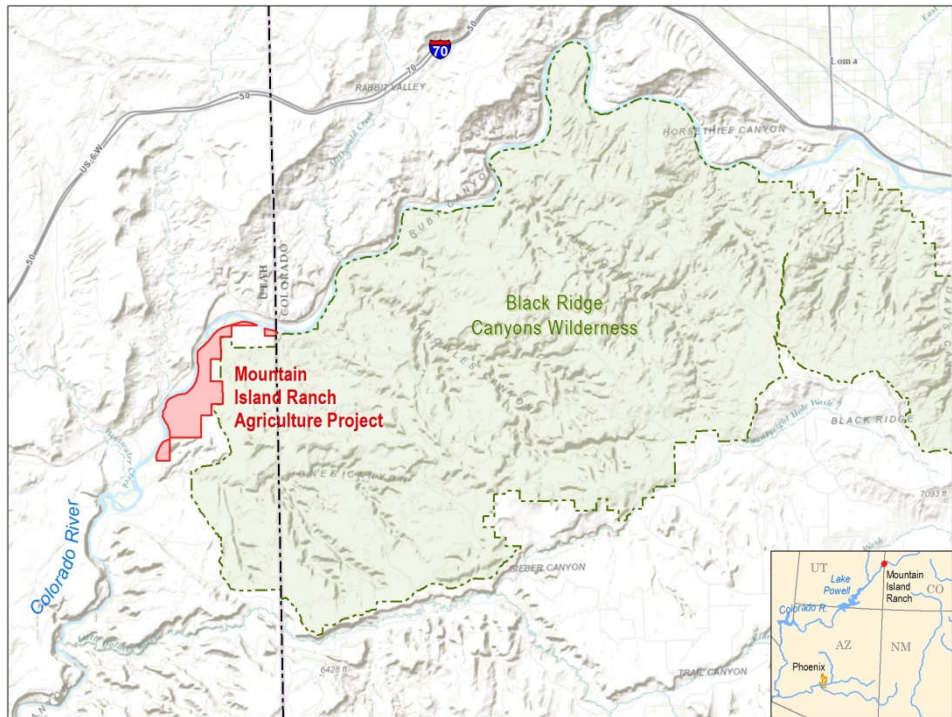
Mountain Island Ranch Agriculture Project

Location: Main Stem of Colorado River near Thompson, Utah

Project partner: Trout Unlimited

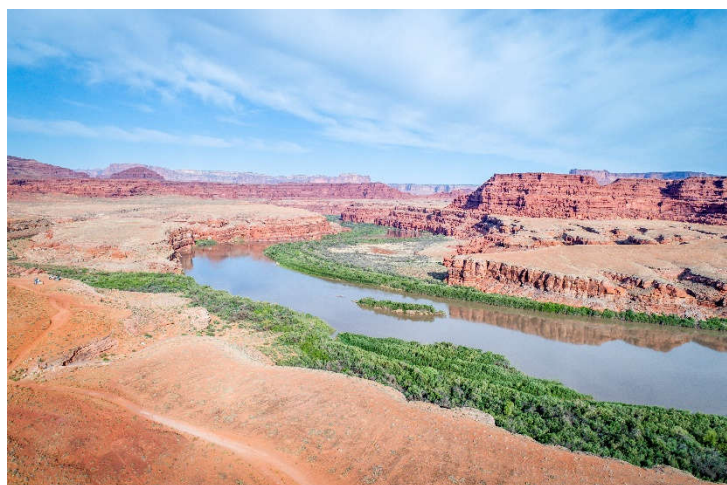
Estimated restore benefit upon completion: 142 million gallons per year

Mountain Island Ranch (MIR) holds grazing leases that support an organic cattle operation on roughly 100,000 acres of BLM land in Utah. The ranch is an environmental oasis in the midst of an arid landscape: it is home to one of Utah’s only four known Bald Eagle nesting sites, a heron rookery, and sensitive riparian areas that support endangered and



threatened fish species. The owners of this multi-generational working ranch are committed to using resources responsibly, and preserving and enhancing critical wildlife habitat. To this end, MIR places profitability and land and wildlife conservation goals on equal footing.

Historically, water was diverted from the Colorado River to irrigate 680 acres of alfalfa and support other agricultural operations. Alfalfa is a relatively thirsty crop, and ranch owners recognized that crops with lower water demand could replace alfalfa as a food supply for cattle. The primary objective of this project is to reduce the volume of water diverted from the Colorado River while sustaining ranch operations and restoring wildlife habitat.



Aerial photo of the Colorado River

Project funding directly supports the conversion of 450 acres of alfalfa crops to cool season, low water use pasture grass. An additional 56 acres of alfalfa

crops will be converted to wetland grasses with similar lower water irrigation requirements to pasture. In addition, 39 acres of upland area will be taken out of production, converted to drought tolerant grasses and not irrigated. One new smart pivot irrigation system will also be installed, incorporating modernized technology to irrigate 167 acres; this automated system will reduce water use and minimize management costs needed to maximize water use efficiency at a remote site on the ranch. The restore benefit is estimated as the reduction in irrigation water consumed through evapotranspiration as a result of conversion from thirsty alfalfa to lower water use pasture, native and wetland grasses.

Water conserved through these activities will remain in the Colorado River as “system water” that will help shore up main stem Colorado River and Lake Powell water levels. This supports broad efforts across the Colorado River basin to conserve water and help ensure that water supplies across the upper basin are adequate to meet delivery obligations downstream to Lake Mead, Arizona and other lower basin states. From a Colorado Basin perspective, the project creates a pilot that showcases solutions that support local ranching needs while freeing up water to help mitigate drought and support economic and community benefits for the more than 40 million people that rely on Colorado River water.

Lower San Pedro River Agriculture Project

Location: Lower San Pedro River, Arizona

Project partner: Arizona Land and Water Trust (ALWT)

Estimated restore benefit upon completion: 62 million gallons per year

The San Pedro River flows through the Sonoran Desert in Arizona for 140 miles until it reaches its confluence with the Gila River, a tributary to the Colorado River. As the last major free flowing river in the southwestern U.S., the San Pedro River provides essential stopover habitat for millions of migratory birds and other wildlife. The health of this critical ecosystem is adversely impacted by extremely low flows and intermittent dry periods in the river, due primarily to ground water depletion and localized pumping and diversion for irrigation.

The objective of this project is to help sustain dry-season flows, critical riparian habitat, and a healthy water table in the Lower San Pedro River by reducing the volume of water withdrawn from the aquifer. Intel is partnering with the Arizona Land and Water Trust (ALWT), a non-profit organization that helps protect water and ranching resources in the Gila River watershed through its Desert Rivers Program. ALWT is collaborating with the Arizona Game and Fish Department to reduce water use on state-owned land along the lower San Pedro River.

The project area includes 110 acres of cropland along the Lower San Pedro River that is owned by the Arizona Game and Fish Department (see figures below). The agricultural fields were historically leased for growing cotton and wheat—these two water-intensive crops were flood irrigated from two wells located near the river. The fields are being converted to drought-tolerant native grasses that do not require sustained, heavy irrigation. Once converted, these properties will be leased for grazing. Intel funds are being directed toward conversion of two farm plots at the site: the middle and south plots (63 acres).



The middle and south agricultural fields were previously flood irrigated to grow cotton and wheat. They are being converted to drought-tolerant native grasses that do not require sustained irrigation.

Photo credit: Arizona Land & Water Trust

The restore benefit is estimated as the reduction in irrigation water consumed as a result of the conversion from cotton and wheat to native grass. This “saved” water will help sustain the riparian ecosystem.

With several ESA-listed bird and fish species in the San Pedro River and its tributaries, widespread efforts are underway across the San Pedro River to reduce groundwater withdrawal and conserve lands and water to benefit flows and critical riparian habitat. This project directly reinforces these related efforts to protect and enhance the function of the San Pedro River ecosystem while supporting local ranching and farming. The program will serve as an important demonstration of how innovative water conservation programs can help sustain working landscapes while protecting and restoring critical riparian habitats.

Barley Conversion Project

Location: Camp Verde, Arizona

Project partner: The Nature Conservancy (TNC)

Estimated restore benefit upon completion: 60 million gallons per year

The Verde River is a key surface water source for metro Phoenix and a lifeline for wildlife in the American Southwest, including migratory birds, nesting bald eagles, rare species of reptiles and amphibians, and many species of native fish. The Verde River is one of only two places in Arizona with an active breeding population of river otter. Like many western rivers, streamflow is low or



Verde River

or nonexistent in some reaches during the hot summer months when water availability is low and peak irrigation needs occur throughout the valley. Resulting low river flows impact ecosystem health and impede river-based recreation.

TNC is leading this collaborative project with local partners including Friends of Verde River Greenway. These organizations recognize that agriculture is an important part of the economic and cultural identity of the area, and they understand that there are innovative opportunities to reduce irrigation water use and support local economic development through crop switching. Traditional summer crops grown in the Verde River Valley such as alfalfa and corn have the largest water requirements in the summer. In contrast, barley is harvested before the critical summer water stress period (figure below). A seasonal shift in crop production, such as switching from alfalfa and corn to malt barley has the potential to improve summer river flows. TNC has successfully employed this strategy over the past two years and proven the viability of the approach.

The objective of this crop switching project is to reduce the volume of water used for irrigation during the critical summer months, leaving more water in the river. Project funds will be used to incentivize farmers to replace 50 acres of alfalfa and 50 acres of corn with malt barley. The water savings benefit is estimated as the reduction in consumptive water use during the summer months (June, July and August) resulting from conversion from alfalfa and corn to barley.

This project is intended to set the stage for, and catalyze a shift to, larger scale barley production that will provide water benefits for the river alongside new market opportunities for local farmers. Market analysis indicates that there is extensive demand for malt barley in Arizona among the growing craft

brew industry. A local benefit corporation located in Camp Verde, AZ has been created to provide a market solution that helps address declining flows in the river while supporting the needs of local farmers. The company purchases and processes the raw barley and sells the malt to craft brewers who are interested in sourcing locally.

In concert with many other water stewardship projects planned and underway in the Verde River, this project plays an important part in demonstrating new pathways to support economic development alongside improved water stewardship.

Long Valley Meadow Restoration

Location: Verde River Watershed, Arizona

Project Partner: National Forest Foundation (NFF)

Estimated Restore Benefit: 20 million gallons per year

Long Valley Meadow is a high elevation meadow located in the headwaters of the Verde River watershed in the Coconino National Forest. The meadow helps capture and store precipitation, and it filters water that drains into the C.C. Cragin Reservoir, part of a system of reservoirs owned and operated by the Salt River Project (SRP). The SRP system delivers water to more than four million residents and businesses located in the greater Phoenix metropolitan area.

Long Valley Meadow provides important habitat for elk, deer and other wildlife. The meadow's role in retaining and releasing water makes it critically important for maintaining the hydrology of headwater streams and for fish and wildlife habitat and recreation.

Long Valley Meadow has been degraded as the result of overgrazing and forest management practices. The loss of vegetation and soil compaction have increased surface runoff which has carved deep gullies with actively eroding banks (see figure below). These impacts have lowered the water table and limited the meadow's ability to store precipitation and release it slowly.

The objective of this meadow restoration project is to reduce erosion and increase infiltration and shallow groundwater storage by reconnecting an incised stream channel to the meadow floodplain. A total of 42 acres of wetlands will be restored using the plug and pond technique on 1,500 linear feet of stream channel. This technique diverts water out of the incised channels and onto the meadow, restoring the floodplain connection and allowing surface water to infiltrate into the groundwater. By reconnecting the channel to the meadow, the soil storage capacity increases and keeps the soil wet for a longer duration in the spring and summer. Acting like a sponge, the restored meadow can increase water available to support native habitat, birds, wildlife, and recreation. The volumetric benefit is estimated as the increase in annual groundwater storage as a result of the restoration.



Coconino National Forest

The project is also expected to limit encroachment of ponderosa pine into the meadow that is occurring as a result of meadow drying, and increase native vegetative cover. When completed, the

project is expected to provide rare meadow habitat that is important for elk and mule deer that rely on meadows like Long Valley as a source of forage (food) in the summer. The tall grasses of the meadow also provide cover for newborn elk and deer. NFF will work with Intel, SRP, the Arizona Elk Society, and other local conservation groups to host volunteer work days to help accomplish the critical meadow restoration work.

This project fits into a larger goal of restoring fire-impacted ponderosa pine ecosystems in Northern Arizona. The Long Valley Meadow Project lies within the footprint of NFF's Cragin Watershed Protection Project, which proposes restoring 40,000 acres of ponderosa pine forest.

Bird Returns Wetland Habitat Creation

Location: Central Valley, California

Project Partner: The Nature Conservancy (TNC)

Estimated Restore Benefit: 47 million gallons per year

The expansive wetlands of the Central Valley once provided critical habitat for migratory birds traveling the Pacific Flyway that extends from Alaska to South America. While California still supports some of the world's largest concentrations of wintering waterfowl and shorebirds, more than 95 percent of California's wetlands have been drained for development and agricultural production, and bird populations are in significant decline. Water tables are falling due to loss of critical recharge areas and pumping that exceeds renewable supply.

The primary objective of TNC's Bird Returns project is to create temporary wetland habitat on agricultural lands through "dynamic conservation" projects that achieve multiple social and environmental benefits. Farmers receive income to pump water from surface waterbodies during the high flow season in the spring and fall and apply it to fallow fields before and after the growing season. The water is applied precisely at the times and locations needed for migratory birds based on real-time bird sighting data and extensive monitoring of past project results. In this way, the project leverages citizen science and precision conservation to provide critical habitat, and much of the water applied to the fields slowly infiltrates and returns to replenish groundwater supplies. Since 2014, this program has provided income to farmers, habitat for birds, and recharge to depleted aquifers.



Snow geese congregate on flooded fields

Photo credit: Drew Kelly, TNC, 2014

The restore benefit is estimated as the volume of water applied annually to the fields that provides habitat and recharges depleted aquifers. Other important benefits include support for migratory bird populations, recharge benefits and farmer income. By supporting the Bird Return's program for ten years, Intel is supporting continued innovations and adaptations to its "dynamic conservation" programs to maximize social and environmental benefits.



Dunlin flock over flooded fields
Photo credit: Drew Kelly, TNC, 2014



Sandhill cranes rest and feed in temporary wetland
Photo credit: Drew Kelly, TNC, 2014

IOTG Smart Agriculture Pilot Project

Location: Washington County, Oregon
Project Partner: Private landowner – Vanasche Farm
Estimated Restore Benefit: TBD

Vanasche Farm is a 100-acre hazelnut orchard in Washington County, Oregon where water demand is high due to growing commercial, urban, and agricultural demands. The farmer recently converted from flood irrigation to drip irrigation to improve water use efficiency. Intel is supporting a pilot study that includes the installation of four soil moisture sensors that allow the farmer to remotely monitor precise soil moisture and weather conditions at their orchard, helping the farmer more efficiently manage the timing and volume of irrigation water applied. With limited water supplies in the Tualatin River basin and growing demands, this pilot helps set the stage to better understand and manage water use so that limited freshwater supply can meet the needs of communities, rivers, and industry.



Vanasche Farm hazelnut orchard
Photo credit: Intel



Soil moisture sensor with young trees
Photo credit: Intel

Reforestation in Lang Sen Wetlands

Location: Lang Sen Wetland Reserve, Vietnam

Project partner: World Wildlife Fund (WWF)

Estimated restore benefit upon completion: < 1 million gallons per year

The 5,030-hectare Lang Sen Wetland Reserve was established in 2004 and in 2015 was officially recognized as an internationally significant wetland (RAMSAR site). This wetland reserve is one of the few remaining remnants of the Plain of Reeds and supports a rich diversity of flora and fauna, many of which are rare. It also helps mitigate flood and drought impacts, and provides fresh water and fisheries to neighboring communities. Dam construction and climate change have altered the natural hydrologic regime of tributaries to the wetland reserve, and have led to forest degradation in the reserve.

The objective of this project is to restore degraded forests to improve wildlife habitat, help mitigate the impacts of floods and droughts, and protect the livelihood of local people who depend on this ecosystem. In 2016, WWF and Intel began a partnership to restore the degraded forests. Roughly 12 hectares were planted with 12,500 native trees in 2016. An additional 7,000 native trees will be planted by 270 Intel employees on 6.7 hectares in the reserve by December 2017.

Priorities for the Future

Intel's commitment to restore 100% of their global water use by 2025 will be achieved by funding collaborative projects to support local watersheds or water supply and restore water in quantities equivalent to the volume consumed. In 2018 and future years, Intel will focus on projects that meet their objectives and prioritize locations based on water consumption rates and local water stress. Because Intel's US locations represent the majority of water consumption, Intel will first focus on projects in the US, while developing projects for locations outside the US. During 2018, Intel's focus will be funding projects in the US (for Arizona, Oregon, and New Mexico watersheds or water supply) while developing projects outside the US.

References

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