Geologic Map of Joshua Tree National Park

California

National Park Service
U.S. Department of the Interior

Geologic Resources Inventory
Natural Resource Stewardship and Science

North
0 10 Kilometers
0 10 Miles



Granitic rock formations such as this one (map unit **Kjcwp** along the Lost Palms Oasis Trail) are scattered throughout Joshua Tree National Park. A product of millions of years of magmatic activity, jointing, and erosion, these geologic features provide an excellent record of Earth's tectonic and climatic history. Photo by Matthew Harrington (Colorado State University).

This map displays geologic map data compiled by the National Park Service Geologic Resources Inventory. It is not a substitute for site-specific investigations. All GRI products are available at https://go.nps.gov/gripubs.

Source Map:
Powell, R.E., J.C. Matti, and P.M. Cossette. 2015. Geology of Joshua Tree National Park Geodatabase: U.S. Geological Survey, Open-File Report OFR 2015-117.

Source Scale: 1:100,000. According to US National Map Accuracy Standards, features are within 50.8 m (166 ft) of their true location.

Poster Layout: Matt Harrington (Colorado State University)

Poster Date: August 2024

Oasis of Mara
West Entrance Station
North Entrance Station
Cottonwood Visitor Center
Pinto Basin Road
PINTO BASIN
HEXIE MOUNTAINS
COTTONWOOD MOUNTAINS
COXCOMB MOUNTAINS

LEGEND

- NPS Boundary
- Paved Roads
- Unpaved Roads

Geologic Contacts
- Known or Certain
- Approximate or Concealed

Faults
- Known or Certain
- Approximate or Concealed

Linear Dikes
- *Kd* - Dike rocks (Late Cretaceous)
- *Kkd* - Dike rocks (Cretaceous and/or Jurassic)
- *Jd* - Dike rocks (Late Jurassic)

Geologic Units
- Qart — Artificially modified landscape (late Holocene)
- Qyad — Young alluvial deposits (Holocene)
- Qya — Young alluvium (Holocene)
- Qyp — Young playa deposits (Holocene)
- Qyd — Young debris-flow and debris-apron deposits (Holocene)
- Qyo — Young alluvial deposits (Holocene and Pleistocene)
- Qyoal — Young and old alluvium, upland pediment apron, sheetwash and channel deposits (Holocene and Pleistocene)
- Qoad — Old alluvial and debris-flow deposits (Pleistocene)
- Qod — Old debris-apron and debris-flow deposits (Pleistocene)
- Qoal — Old alluvium (Pleistocene)
- Qoalpm — Old lake- or playa-margin deposits (?) (Pleistocene)
- Qls — Landslide deposits (Quaternary)
- Qe — Eolian deposits (Quaternary)
- QTpb — Sedimentary strata of Pinto Basin (Pleistocene or Pliocene)
- QTs — Sedimentary strata (Pleistocene and (or) Pliocene)
- QTl — Lacustrine deposits (Pleistocene or Pliocene)
- QTwrs — Residuum saprolite (Pleistocene or Pliocene)
- Tscf — Sedimentary beds of Covington Flat (Pliocene?)
- Td — Debris-flow conglomerate (Miocene)
- Tb — Basalt (Miocene)
- Ts — Sedimentary rocks (Miocene)
- Tm — Maniobra Formation (Eocene)
- Twrs — Weathering residuum saprolite (Tertiary)
- Kq — Granitic dike rocks (Late Cretaceous)
- Khd — Hypabyssal dike rocks (?) (Late Cretaceous)
- Kmqba — Monzogranite, biotite-aluminous enclave-bearing (Late Cretaceous)
- KJc — Monzogranite of Indian Cove (Late Cretaceous)
- Kjf — Granite of Juniper Flat (Late Cretaceous)
- Kqm — Monzogranite of Queen Mountain (Late Cretaceous)
- Kqm+MZPRgn — Monzogranite of Queen Mountain and orthogneiss (Late Cretaceous)
- Ktc — Monzogranite of Thermal Canyon (Late Cretaceous)
- Kqgjf — Granitic, granodioritic, and intermediate rocks, foliated (Late Cretaceous)
- Kmsgf — Monzogranitic rocks, foliated (Late Cretaceous)
- Kmsf — Mafic and intermediate rocks, foliated (Late Cretaceous)
- Kys — Monzogranite of Yellow Spot Canyon (Late Cretaceous)
- KTc — Tonalite of Fargo Canyon (Late Cretaceous)
- Kcg — Granite of Oasis (Late Cretaceous)
- Kl — Layered felsic, mafic, and intermediate rocks, foliated (Cretaceous)
- Kgd — Granodiorite (Cretaceous)
- Kcg — Granite and granodiorite (Cretaceous)
- KJdju — Dike rocks, undivided (Cretaceous and/or Jurassic)
- Kjcb — Monzogranite of Cottonwood Basin (Cretaceous or Jurassic)
- KJcwp — Monzogranite of Cottonwood Pass (Cretaceous or Jurassic)
- KJlf — Granite of Little Fargo Canyon (Cretaceous or Jurassic)
- KJmc — McCoy Mountains Formation (Cretaceous or Jurassic)
- KJpg — Pink granite (Cretaceous or Jurassic)
- KJwt — Monzogranite of White Tank (Cretaceous and Jurassic)
- JqI — Quartz latite dike rocks (Late Jurassic)
- Jrb — Monzogranite of Red Butte Wash (Late Jurassic)
- Jpw — Granite of Pinto Wash (Late Jurassic)
- Jgb — Granitoid rocks of Goat Basin Mine (Late Jurassic)
- Jmi — Mafic and intermediate intrusive suite (Middle Jurassic)
- Jsb — Monzonite, monzogranite, and granodiorite of San Bernadino Wash (Middle Jurassic)
- Jbv — Virginia Dale quartz monzonite (Middle Jurassic)
- Jdl — Dale Lake volcanics (Middle Jurassic)
- Jcp — Quartz monzonite of Cleghorn Pass (Middle Jurassic)
- Ja — Andesite (Middle Jurassic)
- Jl — Limestone (Middle Jurassic)
- Jbq — Jurassic quartz monzonite, quartz monzodiorite, monzogranite, and diorite
- JhI — Monzogranite of Hayfield Lake (Jurassic)
- Jgd — Granite and diorite (Jurassic)
- Jh — Hypabyssal rocks (Jurassic)
- TRmc — Monzodiorite of Munsen Canyon (Triassic)
- TRtp — Quartz monzonite of Twentynine Palms (Triassic)
- MZPRgn — Gneiss (Mesozoic and/or Proterozoic)
- MZPRgg — Leucogranite gneiss (Mesozoic and/or Proterozoic)
- MZPRmag — Mafic intrusive rocks, amphibolite, and gneiss (Mesozoic and/or Proterozoic)
- PRm — Mylonite (Neoproterozoic or Mesoproterozoic?)
- PRsyn — Syenite-mangerite-jotunite of Big Wash (Mesoproterozoic)
- PRdl — Dolomite of Iron Chief Mine (Mesoproterozoic)
- PRpq — Quartzite of Pinto Mountain (Mesoproterozoic)
- PRymr — Metamorphosed residual regolith (Mesoproterozoic or Paleoproterozoic)
- PRgg — Granite gneiss of Joshua Tree (Paleoproterozoic)
- PRgr — Granite of Joshua Tree (Paleoproterozoic)
- PRgp — Granitic and pegmatitic rocks (Paleoproterozoic)
- PRmag — Augen gneiss of Monument Mountain (Paleoproterozoic)
- PRgg — Pinto gneiss (Paleoproterozoic)
- PRgg — Leucogranitic gneiss (Paleoproterozoic)
- PRpgp — Metasedimentary rocks and orthogneiss of Pinkham Canyon (Paleoproterozoic)



Both major and minor fault zones in the park create underground barriers to groundwater flow, forcing water upwards into springs. These springs provide essential access to water in an otherwise arid environment. Springs also support the largest plants in the park, the desert fan palm (*Washingtonia filifera*), as seen at the Lost Palms Oasis. Photo by Matthew Harrington (Colorado State University).

Location Map





A Joshua Tree (*Yucca brevifolia*) stands in front of a granitic inselberg (map unit **Kgd**) near the park's west entrance. The granitic formations of the park formed deep beneath the surface during magmatic events. Millions of years of erosion wore away the rock on top of these granites, exposing them to the surface. Photo by Matthew Harrington (Colorado State University).

Some geologic units from the digital GIS data were grouped together based on similarity in order to create a comprehensive geologic map of the park at a poster-sized scale. This table lists the original geologic units that were combined into the more general units used in the poster.

	Poster Map Unit	GIS Data Map Units
Cenozoic Era — 66 million years ago to present	Qyad	Qyadq, Qyady-pd, Qyady-td, Qyamy, Qyamy-pd, Qyamy-td, Qyamy-vd, Qyamm, Qyado, Qyadm, Qyadmi
	Qya	Qyalq, Qyalq-td, Qyaly-vd, Qyalu, Qyalym, Qyalmg, Qyalms, Qyalmsl/QTwrs
	Qyd	Qydfd, Qydfg, Qydad, Qydal, Qydam
	Qyo	Qyado/Qoadmpm, Qyamo/Qoammg
	Qoad	Qoadyp, Qoadyp, Qoamtyp, Qoadmpm, Qoadmpb, Qoao
	Qod	Qoadlmu, Qodf, Qodad, Qodal
	Qoal	Qoalmg, Qoalms, Qoalmw, Qoammg, Qoad+Qoe
	Qe	Qye, Qyel/QTpbl, Qoe, Qoe-Qolpm, Qe
	QTpb	QTpb, QTpbc, QTpbd, QTpbl, QTpbs
	QTl	Qol, QTl
	QTwrs	QTwrs/Kic, QTwrs/Kqm, QTwrs/Kgqjf, QTwrs/Kbc, QTwrs/Khc QTwrs/Kpb, QTwrs/Kcvp, QTwrs/PRpgp
	Td	Tdfu, Tdfl
	Twrs	Twrs/Kic, Twrs/Kqm, Twrs/Kgqjf, Twrs/Kbc, Twrs/Khc, Twrs/KJwt, Twrs/KJwt, Twrs/Jhl, Twrs/MZPRmag, Twrs/PRpgp
Mesozoic Era — 252 to 66 million years ago	Kl	Klfimf, Klmlff
	Kgd	Kccl, Kcgd, Kbc, Kbcd, Kbcmd, Kevc, Khv, Kpb, Kccp
	Kcg	Kcge, Kcgj, Kcgp
	KJmc	KJmc, KJmcr
	Jbq	Jbqmd, Jbqnm
	Jhl	Jhl, Jhlp
	Jgd	Jg, Jtl+Jg, Jd
	Jh	Jh, Jvh, Jvhl
Proterozoic Eon — 2.5 billion years ago	PRd	PRd, PRdf
	PRpq	PRpq, PRpq1, PRpq2, PRpq3, PRpq4, PRpq5, PRpq6, PRpq7, PRpq8, PRpq9, PRpqgd, PRpqgl, PRpqp, PRpqu, PRpqw
	PRpg	PRpgu, PRpgl, PRpgd

GIS geologic units Qyc, Qoc, and Qc (colluvial deposits) from the digital GIS data are not included in the poster due to scaling and complexity concerns.