

The Green Biome Institute (GBI)

Program Update

June 20, 2023



GBI Overview

- Concept
- Mission
- Progress
- Budgets
- Team
- Background Documents



GBI Concept

Background

Conservation efforts for *endangered plants* are fragmented and dispersed regionally.

- Plants that are hard to propagate (seedless or wet seeds) are not included in most seed banks.
- Endangered plants, including those with relatives that exhibit medicinal or important survival traits are overlooked.
- There are no CSU or UC Institutes or Centers focused on Genomic Profiling of Endangered Plants
- Conservation organizations, government agencies, botanical gardens, and zoos do not have budgets to genetically profile their endangered plants.



The screenshot shows the California Department of Fish and Wildlife website. The header includes the CDFW logo, navigation icons for Home, Fishing, Hunting, Licensing, Conservation, and Learning, and a search bar. The main content area is titled "Botanic Gardens, Seed Banks and Herbaria" and contains the following text: "The following institutions have agreements with CDFW regarding collection, possession, and storage of plant species that are designated as threatened or endangered pursuant to the California Endangered Species Act:"

Botanic Gardens / Seed Banks	Herbaria
<ul style="list-style-type: none">• Rancho Santa Ana Botanic Garden• East Bay Regional Park District• Santa Barbara Botanic Garden• UC Botanic Garden• UC Santa Cruz Arboretum• Zoological Society of San Diego	<ul style="list-style-type: none">• California Academy of Sciences Herbarium• Robert F. Hoover Herbarium at California Polytechnic State University in San Luis Obispo• San Diego Natural History Museum Herbarium• University of California Davis Center for Plant Diversity Herbarium

Below the text is a photograph of a purple flower with a dark center, identified as *Sidalcea oregana* spp. *eximia*. The photo credit reads: "Sidalcea oregana spp. *eximia* CDFW Photo by Michael van Hattem".



GBI Mission

- Sequence & profile 302 endangered California plants by 2026.
- Rank and select plants based on endangered priority and potential for traits that can improve human lives.
- Archive a molecular profile of each plant for future potential use; genome, transcriptome, estimated gene list, chloroplast genome, and the microbiome.
- Profile each plant for potential beneficial medicinal compounds
- Propagate, clone, and seed bank hard-to-store plants
- Post and provide all information freely
- Sponsor exceptional and meaningful student research and grow tomorrow's leaders



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
HABITAT CONSERVATION PLANNING BRANCH
P.O. Box 944209
SACRAMENTO, CA 94244-6423

California Endangered Species Act
Native Plant Protection Act
Scientific, Educational, or Management Permit No. 2081(a)-20-012-RP

GREEN BIOME INSTITUTE
ACTIVITIES INVOLVING STATE-LISTED PLANTS

Authority: This California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA) Scientific, Educational, or Management Permit (Permit) is issued by the California Department of Fish and Wildlife (CDFW). CESA prohibits the import, export, take¹, possession, purchase or sale of any species, or any part or product of a species that is designated by the California Fish and Game Commission as an endangered, threatened, or candidate species.² The NPPA prohibits the import, take, possession, or sale of any native plant that is designated by the California Fish and Game Commission as endangered or rare. CDFW, however, may authorize the import, export, possession, or take of such species by permit for scientific, educational, or management purposes pursuant to Fish and Game Code section 2081, subdivision (a) and California Code of Regulations, Title 14, section 786.9, subdivision (c).

Permittee: Green Biome Institute
California State University East Bay
25800 Carlos Bee Blvd.
Hayward, CA 94542

Contact Person: Chris Baysdorfer, Ph.D.
Professor of Biology and Director
Green Biome Institute
Chris.baysdorfer@csueastbay.edu
(510) 885-3459

Effective Date and Expiration Date of this Permit:

This Permit shall be executed in original form and shall become effective only after the Permittee has signed the last page of this Permit, CDFW has signed the last page of this Permit, and the fully executed Permit has been returned to the Permittee. Unless renewed by CDFW, this Permit's authorization shall expire on **December 31, 2030**.

¹Pursuant to Fish and Game Code section 86, "Take" means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill."

²Candidate species" are species of wildlife that have not yet been placed on the list of endangered species or the list of threatened species, but which are under formal consideration for listing pursuant to Fish and Game Code section 2074.2.

What do we mean- Genomic Profile?

* Genome.

The complete set of genetic material in a cell or organism

* Transcriptome

The collection of all expressed mRNA in an organism

* Chloroplast Genome

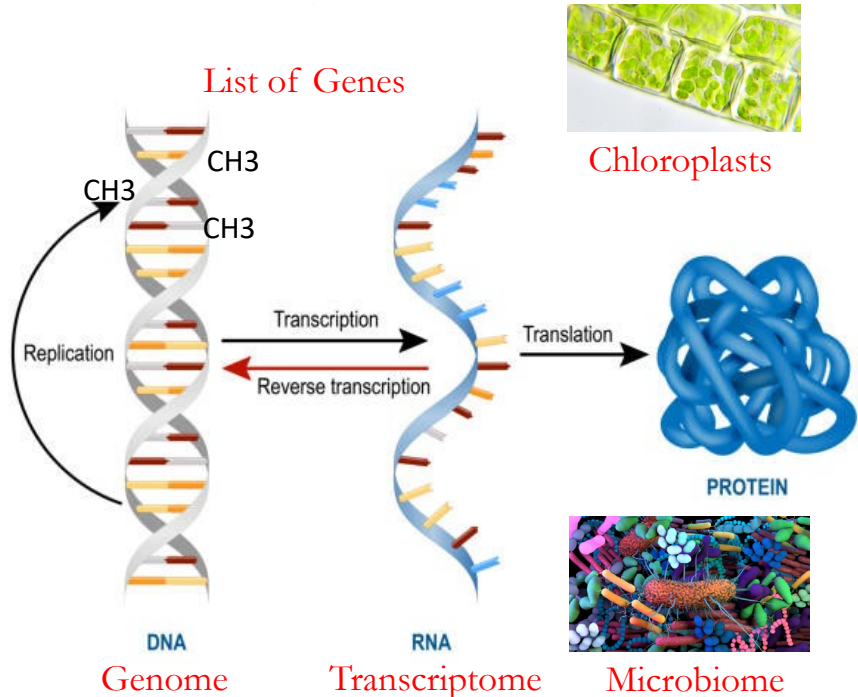
Independent organelles that house photosynthesis and contain their own DNA.

* Microbiome

The collection of all living things in, on, and around the plant including viruses & bacteria.

* List of purported Genes

Transcription and Translation



Progress

Student Training

The foundation of the GBI is our students. GBI goals are attained through student training.

838 students have worked on GBI projects since 2019

GBI-sponsored reagents and plant material are used in one segment of undergraduate DNA Seq and PCR, and Molecular and Cell Biology classes.

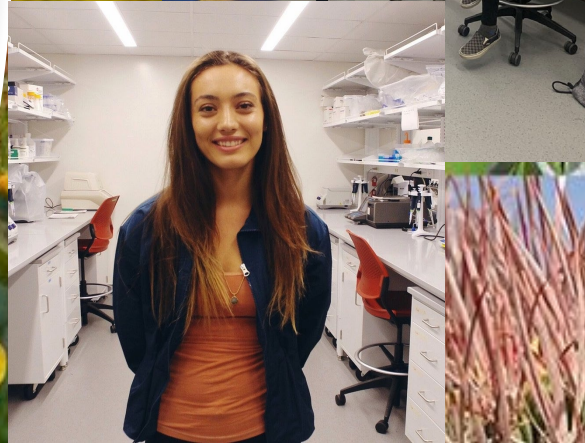
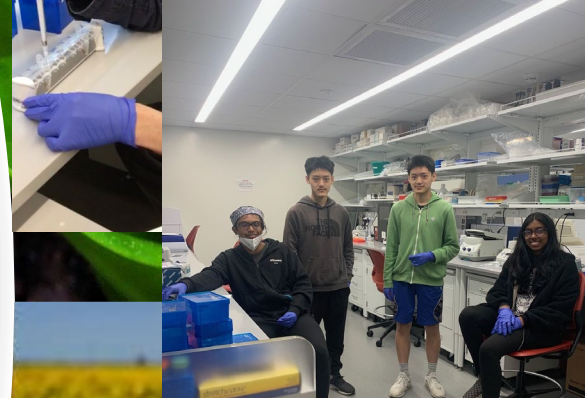
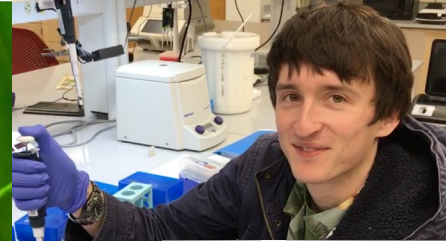
The GBI also supports the summer High School biotech program and numerous Biology Grad students every year.



Progress

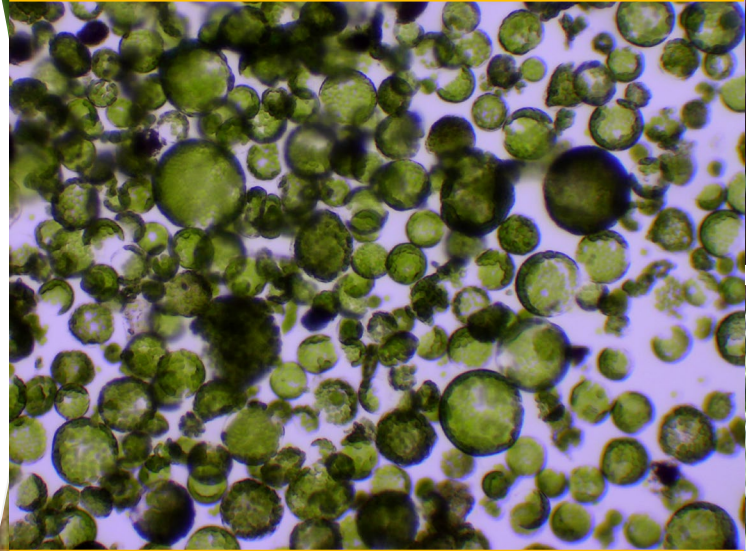
Student Training- Hitting our Stride
On track for close to 300 students/year

- 2019 54 Undergraduate Students
 4 Graduate Students
 7 High School Students
- 2020 57 Undergraduates (Covid)
 5 Graduate Students
 2 High School Students
- 2021 240 Undergraduates
 8 Graduates
 7 High School Students
- 2022 261 Undergraduates
 7 Graduates
 14 High School Students
- 2023 1st Half 130 Undergraduates
 6 Graduates
 12 High School



Progress Plant Collections

- GBI has isolated DNA from 111 endangered California plants.
 - 57 1B.1
 - 49 1B.2
 - 4 1B.3
- Extractions for difficult species ongoing
- Over 100 plants were collected in June 2023 for medicinal compound research
- Extensive plant collection scheduled for summer 2023



Progress

Botanical Partners

- UCSC Botanical Garden
- UC Berkeley Botanical Garden
- Tilden Regional Park
- SB Botanical Garden
- SF Botanical Garden
- California Botanical Garden
- San Diego Zoo
- Luther Burbank Gardens



Progress Archiving Plant Records

CSIEB and the GBI is becoming the central repository of complete records of California's endangered plants



3 GBI_Endangered_Plant_CNPS_Ranking-11-7-21

Search Sheet

Home Insert Draw Page Layout Formulas Data Review View

Calibri 12 A- A+ Wrap Text General

Paste Copy Format B I U Merge & Center

Conditional Formatting Format Table Cell Styles Insert Delete Format Sort & Filter Find & Select

Availability	Accession number	Status	missing status	Freezer	Sorting number	Scientific Name	Common Name	Family	Life form	Habitat	Elevation low	Elevation high	Notes	EO Total number of population	Element count	Federal Listing Status	State Listing Status	Heritage Rank	Rare Plant	CNPS new classification on	CA Native	Other States	Other Status	Seed Banked	Records in CNDRP	Reason for CRB
2	1458 short reads				74	1150	Frutillaria lilacea	Ullaceae	perennial bulbifer	Cimarrone wood	3	410	Threatened by gr82	PMLJ00V00	None	None	G/2/2	18.3	18.3	T	NA	USFS	Yes	Yes		
3	3968 short read, XGR long read (Pediol)				105	242	Prosopis parvifolia	Leguminosae	perennial bulbifer	Lower montane oak	200	1525	Known in CA only 14	PMLJ00R14	None	None	G/2/2	18.2	18.2	F	OR	USFS	No	Yes		
4	39.8 GB short reads				4	Abrosia ajacis	Nyctaginaceae	perennial herb	Meadows and seeps	2000	2700	Known from only #1	PMLY001200	None	None	G/2/2	18.3	18.3	T	NA	USFS	No	Yes			
5	collected by Christine	ba3			383	Boltonia hirsuta	Asteraceae	perennial herb	Chaparral	Cimarrone	5	1555	Threatened by gr51	POA812001	None	None	G/2/2	18.2	18.2	T	NA	BLM/US	No	Yes		
6	Collected by Randy in SBRC	DNA ready			291	Ribes thucheroanum	Grossulariaceae	perennial deciduous	Closed-cone conifer	10	455	Blooms internet#12	PDGR002109	None	None	G/2/2	18.2	18.2	T	NA	Yes	Yes				
7	in 80 freezer	Pine Hill 06/07/21	labeled as Sellantherium suffruticosum, missing, no replicat		54	707	Redwood nettle	Rubiacaceae	herb	Redwood forest	5	587	Bobbe Peak rush-ro	POC82002F0	None	None	G/2/2	3.3	3.3	J	0	0	0	0	Yes	
8	in 80 freezer	collected by Joana 8/13/21			291	Redwood nettle	Rubiacaceae	herb	Redwood forest	5	587	Point Reyes wetlands	POA80405F	None	None	G/2/2	4.3	4.3	J	0	0	0	0	0	0	Yes
9	in 80 freezer	BE0_C208	ba1		68	1009	Ergonum ovalifolium var. vineum	Polygonaceae	perennial herb	Joshua tree wood	1400	2440	Threatened by ml 38	POA80648F	Endangered	None	G/1/1	18.1	18.1	T	NA	Yes	Yes			
10	in 80 freezer	DNA extracted from ba1			75	1156	Frutillaria striata	Ullaceae	perennial bulbifer	Cimarrone wood	135	1455	Threatened by agr 23	PMLJ00V00	None	None	G/2/2	18.1	18.1	T	NA	USFS	Yes	Yes		
11	in 80 freezer	2000.0212	ba2		32	300	Baccharis vaseana	Asteraceae	perennial herb	Chaparral	Pinurite	60	720	Extirpated from #31	POA87090F	Threatened	Endangered	G/1/1	18.3	18.3	T	NA	Yes	Yes		
12	in 80 freezer	PP9279.275	ba2		33	307	Berberis nevadensis	Rubiacaceae	perennial herb	Begs and fens	1915	1400	Threatened by log 11	PMLA002010	None	Rare	G/3/2	18.1	18.1	F	OR	USFS	No	Yes		
13	in 80 freezer	UCR695.1035	ba2	seq	34	311	Berberis nana	Rubiacaceae	perennial herb	Chaparral	Comon	70	825	Many historical on 32	POA806040	Endangered	Endangered	G/1/1	18.3	18.1	T	NA	Yes	Yes		
14	in 80 freezer	84.08.12	ba2	seq	35	363	Bradya similia	Thymelaeaceae	perennial bulbifer	Chaparral	Openings	25	1120	Seriously Threatened 138	PMLJ002050	Threatened	Endangered	G/1/1	18.3	18.1	T	NA	Yes	Yes		
15	in 80 freezer	Pine Hill 06/07/21	ba2	seq	38	429	Callitella stebbinsii	Convolvulaceae	perennial rhizom	Chaparral	Openings	185	1000	Threatened by dex 15	POC80404D0	Endangered	Endangered	G/1/1	18.1	18.1	T	NA	Yes	Yes		
16	in 80 freezer	SBRC.162.581	ba2	seq	41	515	Castilleja missouriensis	Onobrychaceae	perennial herb	Pine Coastal bluff scrub	5	20	Known from Carriz	POC800020	Endangered	None	G/2/2	18.3	18.1	T	NA	Yes	Yes			
17	in 80 freezer	UCR695.1040	ba2	seq	51	513	Chimaphila menziesii var. purpureum	Agavaceae	perennial bulbifer	Chaparral	Comon	205	385	Known only from E18	PRALJ00551	Threatened	None	G/2/2	18.3	18.1	T	NA	Yes	Yes		
18	in 80 freezer	UCR695.0366	ba2	seq	56	761	Delphinium bialei	Ranunculaceae	perennial herb	Broadleaved upland	80	370	Nearly extinct, by 6	POA800000	Endangered	Endangered	G/1/1	18.3	18.1	T	NA	Yes	Yes			
19	in 80 freezer	SBRC	ba2	seq, SBRC	63	942	Eriogonum alissimum	Namaceae	perennial evergreen	Chaparral	Pinurite	80	205	Threatened by em 6	PHYH004010	None	None	G/2/2	18.1	18.1	T	NA	Yes	Yes		
20	in 80 freezer	2004.08.11	ba2	seq	89	239	Ullum murinum	Ullaceae	perennial bulbifer	Broadleaved upland	5	475	Extirpated from SFO	POA800000	None	None	G/2/2	18.1	18.1	T	NA	BLM/US	No	Yes		
21	in 80 freezer	SBRC	ba2	seq	95	367	Mastigophora indica	Asteraceae	annual herb	Chaparral	Bluff scrub	5	30	Threatened by feral herbivores	None	None	G/2/2	18.1	18.1	T	NA	Yes	Yes			
22	in 80 freezer	UCR695.0284	ba2	seq	106	263	Quercus dumosa	Fagaceae	perennial evergreen	Closed-cone conifer	15	400	Threatened by br 180	POA805000	None	None	G/3/1	18.1	18.1	F	BA	BLM/US	Yes	Yes		
23	in 80 freezer	UCR695.082, UC695.083	ba2		4	113	Arctostaphylos bakeri ssp. bakeri	Eriaceae	perennial evergreen	Broadleaved upland	15	300	Threatened by an 3	POA800211	None	Rare	G/2/1	18.1	18.1	T	NA	Yes	Yes			
24	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
25	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
26	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
27	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
28	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
29	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
30	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
31	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
32	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
33	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
34	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
35	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
36	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
37	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
38	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
39	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
40	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
41	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
42	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
43	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
44	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
45	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
46	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
47	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
48	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana	Eriaceae	perennial evergreen	Castal scrub	berg	60	300	Single plant reduced 4	POA800343	Endangered	None	G/2/1	18.1	18.1	T	NA	Yes	Yes		
49	in 80 freezer	89.0145	ba3		23	159	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	555	Threatened by er 41	POA800410	None	None	G/2/1	18.1	18.1	T	NA	Yes	Yes			
50	in 80 freezer	83.0263	ba3		27	166	Arctostaphylos purissima	Eriaceae	perennial evergreen	Castal scrub	60	1025	Threatened by ur 12.3	POA800410	None	None	G/2/1	18.1	18.1	T	NA	BLM/US	No	Yes		
51	in 80 freezer	85.0072	ba3		9	123	Arctostaphylos franciscana</																			

Progress Sequencing

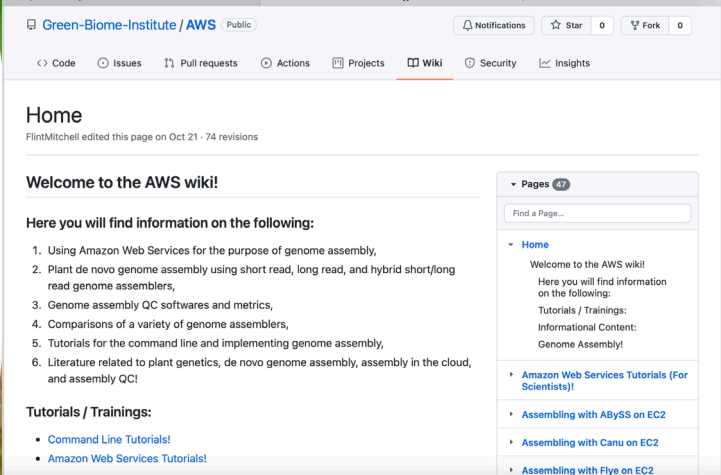
- Total of 52 species sequenced
- Initial analyses completed for 30 species. Average genome size is 1.9GB
- Assemblies completed for 20 species with 10 good results
 - ABySS, Soapdenovo
 - Busco/Quast
- First White Paper draft Report complete



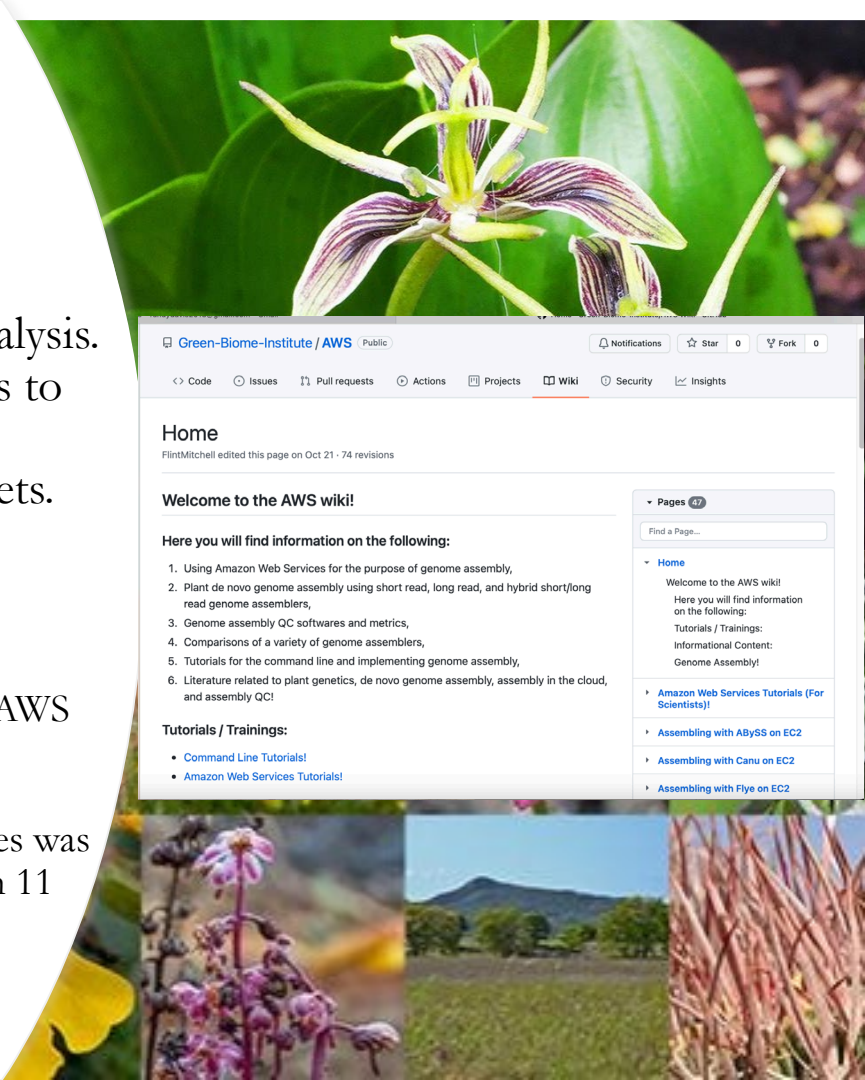
Progress Bioinformatics

GBI has set up a cloud computing Platform for Analysis. One spin out of the effort is to allow students to have AWS accounts with specific budgets. This may be applicable in other schools and classes.

- AWS actively being used
- GBI Github account with an AWS wiki
- In house storage hard disks
- Bioinformatics workshop series was held the summer of 2022 with 11 attendees.



The screenshot shows the GitHub Wiki page for the Green-Biome-Institute / AWS repository. The page title is "Home" and it indicates that FlintMitchell edited this page on Oct 21 with 74 revisions. The main heading is "Welcome to the AWS wiki!". Below this, there is a section titled "Here you will find information on the following:" which lists six items: 1. Using Amazon Web Services for the purpose of genome assembly, 2. Plant de novo genome assembly using short read, long read, and hybrid short/long read genome assemblers, 3. Genome assembly QC softwares and metrics, 4. Comparisons of a variety of genome assemblers, 5. Tutorials for the command line and implementing genome assembly, and 6. Literature related to plant genetics, de novo genome assembly, assembly in the cloud, and assembly QC. There is also a section for "Tutorials / Trainings:" with links to "Command Line Tutorials!" and "Amazon Web Services Tutorials!". On the right side, there is a sidebar with a search bar and a "Pages (47)" dropdown menu. The sidebar also contains a "Home" section with a welcome message and a list of links: "Amazon Web Services Tutorials (For Scientists!)", "Assembling with ABYSS on EC2", "Assembling with Canu on EC2", and "Assembling with Flye on EC2".



Progress Outreach

- NBC Bay Area News 2022
- Science Fair (October) 2022
- Corporate Social
Responsibility report at
Illumina
- Illumina Campus Earth Day
Presentation 2021



Progress Infrastructure

- Seed & Germplasm efforts
 - New Freezer installed
 - New Cloning Incubator installed
- Roof top Green house refurbished and first 20 rare plants set up.

And construction has begun on the new ASC BLDG!!!



GBI Expenses June 2021- July 2022



Expense	Actual as of 10/31/21	Encumbrance	Projected by 01/22	Projected total by July 2022
Supplies	\$16,834		\$29,460	\$90,502
Equipment	\$14,676			\$14,676
Germplasm equipment		\$38,570		\$38,570
Sequencing (Illumina, PacBio, RAD-seq)	\$6,880	\$37,583	\$151,346	\$302,692
Student stipend	\$2,686		\$5,464	\$30,000
Training/conferences		\$3,750		\$7,750
Contractors		\$55,000		\$55,000
AWS				\$25,000
TOTAL				\$577,340

The GBI supports one field collection specialist, stipends for students, and equipment and reagents. Income includes individual donations, Forest Service, NSF, and Amazon Web Services grants, deeply discounted sequencing services from UC Berkeley Sequencing Center, and donations from Illumina (a sequencing company).

Team - GBI Scientists



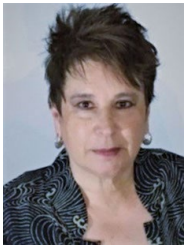
Chris Baysdorfer - Director, Plant Genomics, Berkeley



Weilun Tan - Lab Manager, Biology Graduate of CSUEB



Ann Perry - Assoc. Director, Biology Dept. Chair, Fungal & Environmental Genomics, Harvard



Ana Almeida - Assoc. Director, Plant Medicinal Compounds, Berkeley, Medical Degree EBMSP, Brazil.



Ana Garaventa- Staff Scientist, Botanist, senior member of the California Native Plant Society, CSUEB & SFSU

Jason Singley – Dean, College of Science, CSUEB, UCSD

Team – GBI Advisors



A solid team from Industry, Government, & Academia

Janine Corcoran - Director of Development, CSUEB

**Flint Mitchell - Principal, Mitchell Engineering Services,
Plant Bioinformatics**

Christine Scoobee - Field Botanist and Photographer

Kevin Corcoran* - Past VP Agilent Technologies

**John Preece - Past Head of the National Clonal Germplasm
Repository at UC Davis, Riverside, and,
Peltier, CA.**

**Lee Kozar* – Director Computational Services and
BioInformatics Facility, Stanford University**

Randy Davis* - Board of Directors 4M Genomics

Background Documents

- Green Biome Institute Mission Statement
- List of Conservation Websites
- List of all 545 CSU Institutes
- GBI Working Plant List
- Criteria for GBI Plant Selection
- List of Endangered Medicinal Plants
- CA Botanical Gardens that handle Endangered Plants
- CA Native Plant Society Endangered Plant List
- CA Dept Fish and Wildlife Diversity Database and Seed Bank List
- Links to Worldwide Genomics Projects
- Example Rare Plant Photos and Geographic Locations

