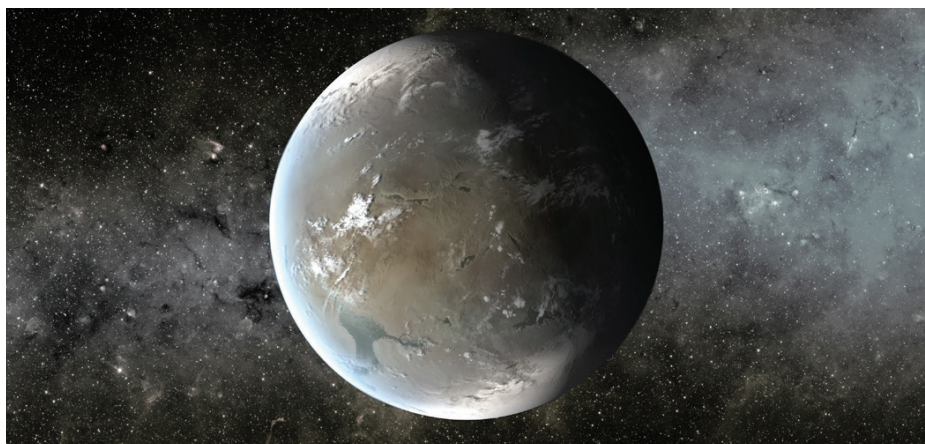


New life sought for exoplanet hunter

By Mark Whalen



Artist's concept of Kepler-62f, a super-Earth-size planet in the habitable zone of a star smaller and cooler than the sun, located about 1,200 light-years from Earth. Kepler-62f is one of five planets in the Kepler-62 system.

There could be a new lease on life for an iconic planet-hunting telescope that is in a state of flux.

The Kepler mission, whose development was overseen by JPL, has thus far discovered about 3,200 exoplanet candidates, all quite likely to be real planets, with 132 confirmed as true planets. The spacecraft is in safe mode while team members work to resurrect two of Kepler's four reaction wheels that malfunctioned. The wheels normally keep the spacecraft correctly pointed.

Deputy Project Scientist Nick Gautier of JPL noted that one wheel was turned off in July 2012 due to friction issues, while another failed in May of this year.

In mid-July an anomaly response team at NASA Ames Research Center, which manages the mission, will try spinning the wheel that was turned off more than a year ago. "We turned that one off before it had a hard failure," said Gautier. "That wheel is likely to behave better now because it was turned off before it froze up."

Gautier said mission managers believe there's a chance they might get the recently demised reaction wheel spinning again, but they're not sure how it might perform and how long it might stay alive. "Whether its performance might be good enough to allow us to return to the exoplanet survey mission that we were doing before, we don't know, we'll have to see," he said, adding that a revived wheel is not expected to last very long.

But mission managers are also exploring the possibility of using the two functioning wheels to extend the mission for a long period of time. "If we want to extend it past whatever revived wheel life we get—or if we can't use the wheels at all—then we have to look into the technical feasibility, scientific viability and cost of doing this in a two-wheel hybrid mode," said Gautier.

Still in all, Kepler—NASA's first mission capable of detecting Earth-size planets around stars like our sun—has about two years worth of data yet to be analyzed. In early June the team delivered 1,924 new Kepler objects of interest to the NASA Exoplanet Archive. Gautier said about 500 of those have been subjected to the rigorous vetting and false-positive rejection process to be considered good planetary candidates.

Continued on page 2

Telling the story

By Franklin O'Donnell

When the Curiosity rover descended toward Mars last summer, tens of millions of Americans knew what to expect thanks to "Seven Minutes of Terror," a gripping video produced at JPL that went viral on the Internet.



Some 130,000 elementary school teachers received JPL training to teach children language skills and science through "Reading, Writing and Rings," a program featuring content based on the Cassini mission to Saturn that the National Science Teachers Association called "outstanding."

Each year, more than 500 college and high-school students spend the summer at the lab, learning valuable skills and, in many cases, entering the "pipeline" to become JPL employees of the future.

These and other successes have made JPL a leader across NASA in public engagement and education—how the lab and the space agency share the excitement of their missions with the public on the Internet, in the classroom and in communities across the country. Ironically, some of those programs face the biggest threat in their history due to budget and policy changes proposed this year in Washington.

Continued on page 2

“One of the things we look for is whether an object we’re looking at that we think has a planet around it changes position on the sky during the planet’s transit—or not,” said Gautier, referring to when a planet passes in front of its star to block some of the starlight. “If it does change position, it probably means that there’s a neighboring object. So the position we see is the average position of the neighboring object and the object we’re looking at, weighted on their brightness.”

Enter the Spitzer Space Telescope to the planetary hunt by following up on many of Kepler’s key observations. “If you look at the transit with Spitzer and compare the depth with that which is seen by Kepler, you can either validate the Kepler discovery or show that it’s a false positive. Spitzer has been used to do that for



A dense group of stars being born in the constellation Perseus is revealed in this infrared view from JPL’s Spitzer Space Telescope. The area is 1,000 light-years from Earth.

more than 50 Kepler transits,” noted Mike Werner, JPL chief scientist for astronomy and physics and the Spitzer project scientist. Spitzer confirmed or validated the Kepler discovery in almost every case, Werner added.

“As a precision photometer, in an orbit where it can look at the Kepler field continually for six or seven months out of the year, Spitzer could confirm or follow up on indications from Kepler of possibly interesting transiting planets,” Werner said, noting that Spitzer is making unique measurements of the atmospheres of the larger transiting planets found by Kepler.

“Kepler is so important scientifically,” he added. “We’ll be looking very hard at how Spitzer can fill some of that gap as we develop our senior review proposal for the next two years of the Spitzer mission.” Werner said more will be known in the early fall, when another proposal cycle is completed for Spitzer.

Meanwhile, another JPL-developed telescope mission has been turned off after completing a decade of observations using the ultraviolet to study hundreds of millions of galaxies across 10 billion years of cosmic time.

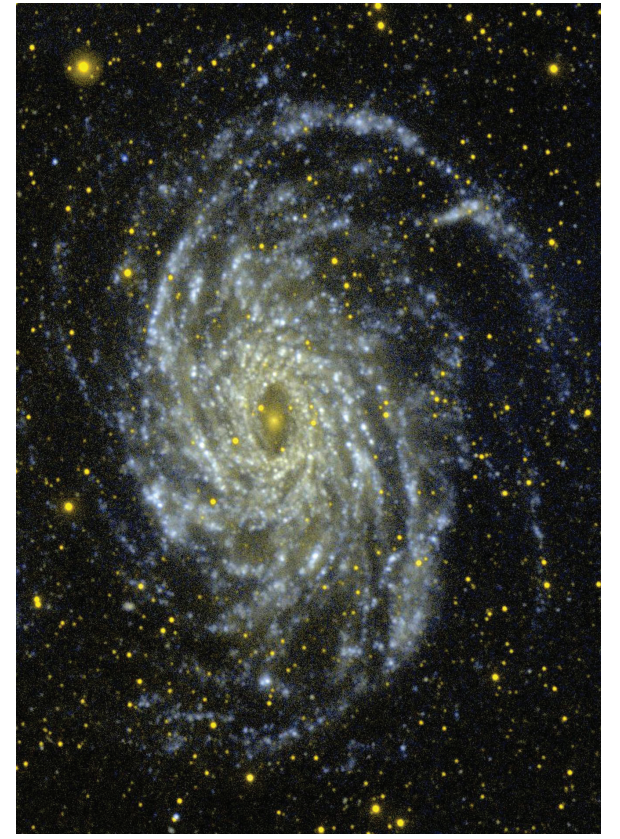
The Galaxy Evolution Explorer, which met its prime objectives and was extended three times, was canceled due to lack of funding. Orbital Sciences Corp. in Dulles, Va., sent the signal to decommission the spacecraft on June 28.

In a first-of-a-kind move for NASA, the agency in May 2012 loaned the spacecraft to Caltech, which used private funds to continue operating the satellite while NASA retained ownership. Since then, investigators from around the world have used the spacecraft to study everything from stars in the Milky Way galaxy to hundreds

of thousands of galaxies 5 billion light-years away.

“The mission may be over, but its science discoveries will keep on going,” said Kerry Erickson, project manager at JPL.

Data from the last year of the mission will be made public in the coming year. A slideshow showing some of its popular images is online at <http://go.nasa.gov/17xAVDd>. ■



This image from JPL’s Galaxy Evolution Explorer shows NGC 6744, one of the galaxies most similar to the Milky Way and about 30 million light-years from Earth.

TELLING THE STORY *Continued from page 1*

If enacted, the White House’s fiscal year 2014 budget request and other proposed changes at NASA would cut JPL’s communications and education programs by nearly a half. In recent weeks, however, strong support from legislators and science organizations has raised hope that the cuts will not be enacted.

“News of cuts to these programs came as a surprise,” said Blaine Baggett, director for JPL’s Communications and Education Directorate. “Since then we’ve been gratified by the support, both internal—and more importantly—the voices of so many across the country who have voiced the value they hold in NASA’s public engagement activities. It’s very encouraging, but we are not out of the woods yet.”

The first challenge to confront education and public engagement arrived in March. At that time, across-the-board budget cuts at federal agencies—known as “sequestration”—were triggered when Congress failed to pass a deficit reduction plan. In response, NASA announced restrictions on conferences, travel and training—then added suspension of all public engagement and education events, programs and activities. Soon afterwards the agency announced a number of exemptions

to the policy. Later, centers and offices were informed they could submit requests for waivers in order to continue with programs they deemed essential.

In April, the Obama Administration released its budget request for fiscal year 2014, which contained another surprise for the education world. Under this plan, all of the federal government’s science, technology, education and math (STEM) education programs would be consolidated under the U.S. Department of Education, the National Science Foundation and the Smithsonian Institution. In the process, about \$43 million in education funding would be removed from NASA’s Education Office and another \$42 million directed at public engagement from the agency’s Science Mission Directorate.

Support for the programs quickly surfaced from a variety of sources. The changes “would dismantle some of the nation’s most inspiring and successful STEM education assets,” the American Astronomical Society said in a statement. The Planetary Society called the proposals “short-sighted and counterproductive.”

On June 4, the House Committee on Science, Space and Technology held a hearing on the proposed reorganization of STEM education where, according to Science magazine, legislators expressed “a steady stream of

skepticism” about the plan that the publication called “refreshingly nonpartisan.” “I believe that dismantling NASA’s education and outreach efforts would deal a serious blow to our nation’s scientific and technical literacy,” space scientist Steve Squyres of Cornell University said in a statement to the House panel.

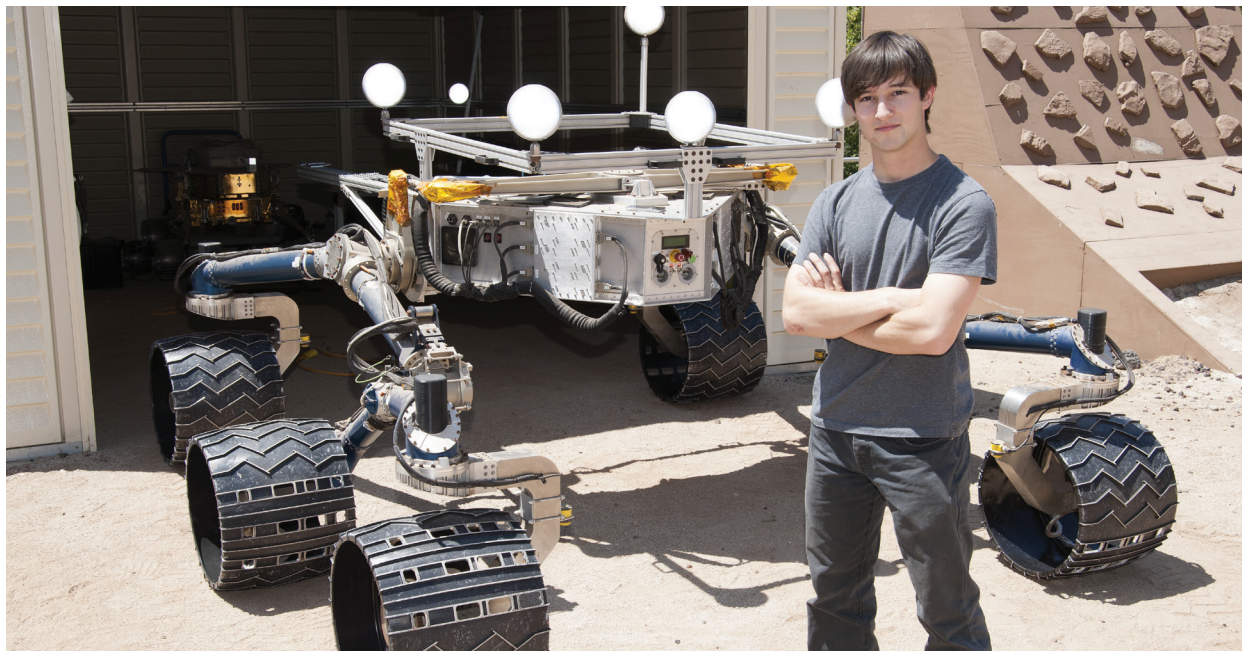
However, JPL’s executive manager for legislative affairs, Rich O’Toole, cautioned that such support may not have any teeth if Congress does not pass an FY14 authorization or appropriation bill for NASA this year. “It’s likely that Congress will end up passing a continuing resolution, which would keep funding for NASA at this year’s level,” said O’Toole. “If that is the outcome, there may not be a mechanism for Congress to give NASA or the administration direction on maintaining these programs.”

In the meantime, JPL Director Charles Elachi has expressed strong support for the laboratory’s public engagement and education programs, calling them one of the lab’s core competencies alongside its technical programs. “I’m absolutely committed to maintaining a very vibrant education and public engagement program at JPL,” he said. ■

Summer students onboard

By Mark Whalen

About 600 college and high-school interns hope to gain valuable experience



Dutch Steger / JPL Photo Lab

Riley Avron works on the Scarecrow prototype rover.

Remember Clara Ma, the student from Kansas who gave the Mars Curiosity rover its name in 2009? She is back at JPL for the summer, with her sights set beyond the Red Planet this time.

"In a way feel I like I grew up here," she said. "The deer, the mountains, walking up the hills, I love all of that."

Clara's summer job working on the Mars outreach website involves identifying features on Earth that are also on Mars, particularly volcanoes. She also studies planetary moons, "especially Io, Enceladus and Europa."

"Being an intern here means so much to me," she said. "I'm just so grateful to have this opportunity to be back at JPL."

Clara is one of more than 600 college and high-school interns onboard for the summer. Clara, now 16, is one of 60 high-school interns at work for a 10-week session that began in June. The JPL Education Office and Human Resources Directorate partner in the intern program.

Eduardo Lopez, a Cal State San Bernardino senior who works in the robotics lab in Building 198, thinks his niche in the near future will be in artificial intelligence. A U.S. Marine Corps veteran specializing in communications, he is keen on both military and commercial applications for robots performing as humans would.

"I'm interested in building intelligent robots and allocating to them the tasks that currently require human intelligence," Lopez said. "Also, I have a strong interest in seeing how some of the military technological innovation makes it way into improved civilian products, and vice-versa; how the latest commercial advances provide a technological superiority to our military."

A bachelor's of science is expected next June, and Lopez plans to study more about artificial intelligence and robotics—he intends to pursue a master's in electrical engineering based on his experiences this summer.

Riley Avron, who will be a junior at Purdue University in the fall, is building on his experiences as a summer intern last year. He is revising system code on the Scarecrow prototype rover to increase compatibility with other systems on lab.

"It's an architecture based on the Athlete (All-Terrain Hex-Limbed Extra-Terrestrial Explorer) rover, so it's not too different to jump to a flight-like system," Avron said.

Avron, who began at JPL as a high-school student in 2010, made JPL his choice over Space Exploration Technologies Corp. (SpaceX) this summer, among others. "JPL will always have a special place in my heart," he said. "I find it very inspiring."

"Working at JPL is the coolest thing I've ever done!" said Emily Schneider, a University of Wisconsin-Madison

journalism major working in the Human Resources Directorate's University Relations and Staffing Operations Group. Her work this summer will help spike JPL's social-media presence for recruiting.

Schneider enjoys JPL's "very relaxed, open and friendly" environment. She searched both the east and west coasts for internships in emerging media, "and JPL was definitely the one I was the most excited about. It was the best fit."

Schneider's supervisor, Paula Caterina, hopes to have an upgraded social media presence in place by mid-July to implement for fall recruiting.

"We want reach out to a larger group of targeted students," she said. "We are doing our research now and considering various platforms such as Facebook, LinkedIn and Google+."

Competition for JPL internships is strong. Hundreds of students apply from all over the country. Besides the invaluable work experience, all interns take advantage of numerous activities over the course of the summer, including a barbecue, tours, career fair, speaker series and workshops.

Many interns enjoy the JPL experience so much that they return for an additional summer or two, noted David Seidel, manager of elementary and secondary education in the JPL Education Office. "A lot of mentors and student interns have multiple-year experiences, including some who start in the high-school program and return for a summer while attending college," he said.

Seidel and Higher Education Group Supervisor Adrian Ponce meet weekly with Caterina and Engineering and Science Directorate managers to discuss recruitment issues, targets and goals.

"An intern or fellow is essentially getting an audition, so they're learning about JPL and whether they like the work environment here," said Seidel. "At the same time, JPL mentors and their colleagues have a chance to see the students' work, talk to them, have interviews and see if it's a good match."

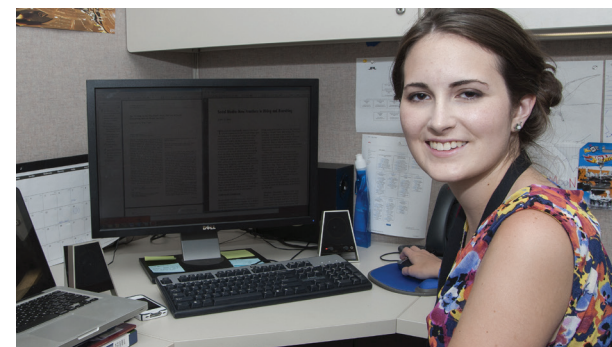
"Our programs are meant for educational value to the student," Seidel added. "By the same token, they are providing valuable support to their mentors. So JPL is getting quality work out of quality students." ■



Clara Ma is identifying features common to Earth and the Red Planet.



Eddie Lopez is building on his experience with military artificial intelligence systems.



Emily Schneider is helping JPL's recruiting efforts through social media.

Richard Hasegawa / JPL Photo Lab

News Briefs



Carol Raymond



Randy Friedl



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Raymond named to lead small bodies program

Carol Raymond has been named manager of the Solar System Exploration Directorate's Small Bodies Program Office. In this role, she will coordinate JPL studies, proposals, projects, ground and space observational campaigns that seek to detect, understand and interact with small bodies.

She will also represent JPL's Small Bodies Program to NASA and the science community.

Raymond joined JPL in 1990. She served as the deputy chief scientist of the NASA New Millennium Program from 1995–2001 and in 2002 assumed her current role as the deputy principal investigator and project scientist on the Dawn Discovery Mission to Vesta and Ceres.

A recipient of five NASA Group Achievement Awards, Raymond has more than 70 peer-reviewed publications covering her research on Earth's tectonics, ice sheet history, magnetic fields on Earth and Mars, mission design for a range of mission types, and the character and evolution of asteroids Vesta and Ceres.

Friedl to manage Earth System Science Formulation Office

Randy Friedl has been appointed manager of the Earth System Science Formulation Office (8300).

Since joining JPL in 1986, he has served as deputy director for research in the Engineering and Science Directorate, chief scientist for the Earth Science and Technology Directorate and research element lead in the Science Division.

Friedl has also worked at NASA Headquarters' Science Mission Directorate as the deputy chief scientist for Earth science and deputy for science in the Earth Science Division, as well as project scientist for an aeronautics/Earth science research program on the environmental effects of aviation.

He currently serves as associate director of UCLA's joint institute with JPL on regional Earth system science and engineering and as adjunct professor within the UCLA Department of Atmospheric and Ocean Sciences.

Industry honors for JPL information technology

The JPL Information Technology Directorate has been recognized with industry awards for innovation and for being one of the best places to work in the field.

JPL was named among CIO magazine's "CIO 100," as "one of 100 innovative organizations that uses IT effectively to create business value." This is the second time JPL received the honor, having also been named last year.

The award recognizes JPL information technology's partnership with Mars Science Laboratory as part of its initiative of changing into a proactive, action-oriented organization. Cloud computing was used extensively for outreach and mission-critical events—providing unprecedented network access—and enabled JPL mobile applications, mobile games and website innovations.

JPL information technology will be profiled along with other winning companies in the August issue of CIO magazine.

Also, JPL was named to Computerworld's 2013 list of 100 Best Places to Work in IT. JPL placed 16th overall in the annual ranking.

The survey also ranked JPL third among midsize employers (2,500 to 9,999 employees) behind Quicken Loans (first overall in the survey) and Transocean.

This is the first time JPL has won the award. The list is compiled based on company offerings in benefits, diversity, career development, training and retention, as well as survey responses from information technology employees.

"I'm very proud and happy that the innovation, excellence and hard work of all JPL's IT employees are recognized by these industry organizations," said JPL Chief Information Officer Jim Rinaldi.

For more information, visit <http://www.computerworld.com/spring/bp/2013/1>.

Lab does well in safety audits

JPL's Oak Grove and Goldstone facilities fared well in recent NASA safety audits.

An institutional/facility/operational safety audit conducted by NASA June 17 to 21 at Oak Grove followed inspections in late April at the Goldstone Deep Space Communications Complex.

Neither facility received any critical or catastrophic findings in the audits. The Oak Grove facility received eight commendations, 10 observations and 20 findings. Goldstone received one best practice, six commendations, 12 observations and 16 findings.

Among the commendations were JPL's quick response to correct items identified during the audit; the new state-of-the-art Emergency Operations Center; the procurement review process for pressure-related items; and JPL's 24/7 Immediate Mishap and Close Calls hotline.

For more information, please contact the Occupational Safety Program Office at ext. 4-4711 or visit <http://safetyfirst.jpl.nasa.gov>.

Retiree excursions planned

The Associated Retirees of Caltech/JPL have planned monthly trips to local attractions from September to December.

The following excursions have been scheduled:

Sept. 18: Heritage Valley train tour. Fillmore to Santa Paula by vintage railroad with a three-course lunch on the train.

Oct. 19: 25th annual picnic in Tournament Park at Caltech. Barbecue and Bingo.

Nov. 1: Apple Country in Oak Glen. Pick apples, shop, lunch and free pie.

Dec. 6: Christmas at the Reagan Library. A self-guided tour including Air Force One, tree decorations and buffet lunch.

All trips leave from the La Cañada Methodist Church on Berkshire Place.

For more information, visit www.arcjplcaltech.com or contact Warren Moore at 818-790-4576.

Thanks for the memories



Thom Wynne / JPL Photo Lab

JPL on June 10 bid farewell to Caltech President Jean-Lou Chameau and his wife, Carol Carmichael, before the pair departed for his new position as president of King Abdullah University of Science and Technology in Saudi Arabia. Under Chameau's leadership, Caltech was named #1 on the Times Higher Education World University Rankings in 2011 and 2012. Prior to joining Caltech in 2006, Chameau was provost of Georgia Tech University.

Kudos for systems engineering excellence



NASA Chief Engineer Mike Ryschke, right, presents the Europa Habitability Mission Systems Engineering Team award to JPL Engineering and Science Director Leslie Livesay and Dawn's award to mission director Marc Rayman.

JPL has been honored for excellence in systems engineering with two awards from NASA's Office of the Chief Engineer.

The lab shared honors in both categories of the 2013 NASA Systems Engineering Excellence Award. The Dawn Flight Team was one of the two award winners in the Programs and Projects

category, while the Europa Habitability Mission Systems Engineering Team/Integrated Model-Centric Engineering Initiative—led by Steve Jenkins and Todd Bayer—was one of the two award winners in the Techniques and Methodology category.

For more information, visit the NASA systems engineering community website at <https://nen.nasa.gov/web/se>.

Letters

My family and I thank JPL and all my co-workers for the beautiful Eiji's plant, kind thoughts and condolences during the recent passing of my father-in-law Jorge Sifuentes.

Jose and Martha Coito

We would like to wholeheartedly thank our extended JPL family, especially the Office of the CIO, for your support and comfort not only during the recent passing of our beloved mother, but through the years. We are touched by the out-

pouring of love you have given us. Your kind thoughts, support and generosity are truly appreciated. Also, thank you to JPL for the beautiful plants that have brightened our home. With gratitude, Linda Maleki, Cindy Trinh and Huyen Duong

Retirees

The following employees retired in June: **Mahadeva Sinha**, 35 years, Section 382D; **Paul Kulkarni**, 28 years, Section 2812; **Joyce Pulliam**, 25 years, Section 605.