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a. Need for the project and The magnitude of the need for the services to be provided. The *NAEP 2015 Science State Snapshot Report Hawaii Grade 4 Public Schools Overall Results* reported that the average score of fourth-grade students in Hawaii was 146. This was lower than the average score of 153 for public school students in the nation. For 8th graders, the science score was 144, which is considered *significantly* lower than the average score. Only four states were lower than in Hawaii. In 2015, Hawaiian students who were eligible for free/reduced-price school lunch, an indicator of low family income, had an average score that was **28 points lower than that for students who were not eligible.** This performance gap was not significantly different from that in 2009 (24 points). [i] *Native Hawaiians are not improving*.

Native Hawaiians (NH) are socio-economically disadvantaged. Many reports have outlined the social inequalities and hardships faced in Native Hawaiian (NH) homes and communities due to low incomes and disparity between the economic status of Native Hawaiians and Hawai‘i State (Kamehameha Schools, 2014; Asia Pacific Exchange & Development, 2010). The median household income in Hawaii was $69,515. Of the five largest race groups in Hawaii, Filipinos had the highest household income and ***Native Hawaiians had the lowest.***[ii] Native Hawaiians have the highest poverty rate of any subgroup in Hawai'i at 15.5 percent, compared to 7.7 percent in the state as a whole.[iii] **Therefore, our project addresses Absolute Priority (b) the needs of at-risk children and youth.**

These facts support the need for Science, Technology, Engineering and Mathematics (STEM) learning for our NH children, but this is only one of two needs of great magnitude experienced by our families. **Food insecurity** for a household means having difficulty during the year providing enough food for all their members due to a lack of resources. In Hawaii, approximately 16.7 % of households are *food insecure,* compared with 14% in the US. Unhealthy

food consumption can affect health in many ways, and it has taken a heavy toll on our people.[iv]

For the first 150 years of Western contact with Hawaii, the cause of near genocide of the NH people was microbes and parasites. However, today there is a new killer in the Pacific, what some epidemiologists call the "New World Syndrome," the assault of rapid Westernization and processed foods on traditional cultures.[v] Concerns over evidence that we import as much as 85-90% of our food are compounded by the islands' geographic isolation.

"I think there's a sense here in Hawaii that if we have a hurricane or a tsunami, how long could we last with our food supply?" said Jenai Wall, chief executive of Foodland, Hawaii's largest supermarket chain, which relies on imports for about 80 percent of its sales. "Not very long."[vi] Probably less than a week. "If something catastrophic happened on the mainland, we'd have about three days of food in the stores," said Una Greenaway, a farmer on the Big Island. "We're very, very food insecure here…"[vii] *Located more than 2,500 miles from its food supply, Hawai'i must take steps to produce more food close to home for community food security.*[viii] The proposed **Waiawa Kai Project** will be conducted at the Cultural Center of Keiki O Ka Aina Family Learning Center (KOKA) at Waiawa. This agriculture and STEM integration project will address the problems of a lack of STEM education for our children and youth, as well as the food insecurity experienced by many Native Hawaiian families.

ii. The extent to which specific gaps or weaknesses in services will be addressed. Today, at the elementary school level, there are relatively few in-school food and agricultural education programs being delivered, as teachers in public elementary schools tend to focus on subject areas covered in state standards and testing. A 2007 survey of elementary and junior high teachers in eight Illinois[ix] counties found that some teachers did not integrate agriculture in their classrooms because they did not view it as appropriate for their situation, because it took time away from

preparing students for state proficiency tests, or they did not have access to good instructional resources on the subject. Of those who **did** attempt to incorporate agriculture in their teaching, they cited 'connectedness' and 'authenticity' as key themes for that decision. Access to better curricula resources and agricultural-related projects and activities were concerns of these teachers as well. This was a small study, but it highlights many issues teachers face integrating food and agriculture topics into existing curricula.

The Waiawa Kai project addresses these gaps and weaknesses as will be demonstrated in the quality of our project design. Our community-identified problem is this: *Hawaiian families cannot access agricultural knowledge that can help make their food secure while NH children lack STEM Knowledge and Skills to help them be competitive in the 21st Century workplace.* Our Goal is: *Hawaiian families will increase food security knowledge while NH children gain STEM knowledge necessary for careers in the 21st-century workforce.*

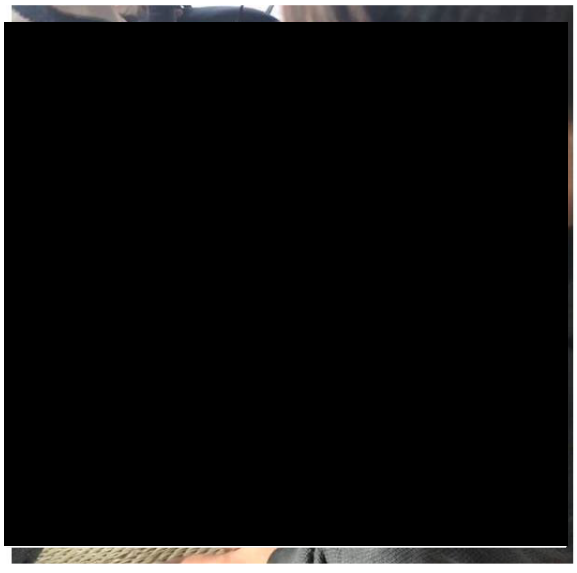
b. Quality of the project design i. The extent to which the design of the project is appropriate to the needs. We will address these needs through an agriculture/STEM integration project located on our 6+ acre Cultural Center in the 'Ewa district on O'ahu Island, an area with a high population of Native Hawaiian families. The geographic performance area of the Project is located at Tax Map Key No.: 196-003-026 (por.) and 196-003-025 (por.) As of September 1, 2017, 6.23 acres designated AG-2 were licensed to KOKA in the 'Ewa district. The area is located behind Leeward Community College (University of HI) with a view of the middle loch of Pearl Harbor. It slopes through currently taro patches and fishponds, to an estuarine environment adjacent to the Pearl Harbor National Wildlife Refuge. A map is included in Attachments. Much of this area was devoted to agriculture by the inhabitants throughout the 1800s due to the abundance of water from springs and streams. The site allows generous cultivation of crops, fish propagation, and

recreational uses, including day camps. It is the perfect site for the Waiawa Kai Project and proposed Agriculture and STEM Integration.

[redacted]

These workshops include our most popular Board and Stone classes, which teach families how to make their poi pounding board and the stone poi pounder. A strength of the Hawaiian community is that we "learn by doing", which is an important component of STEM learning. This traditional way of knowing and learning is captured in the proverb *ma ka hana ka ike* – by doing one learns.

[redacted] They will work in the lo`i growing *kalo*, they will have cultural workshops (there are 13 workshops needed to learn how to make the ax to cut the board. How to select the wood and the stone from nature and the protocol to follow, how to prepare the kalo, and finally, how to pound the poi.) [redacted]



[redacted] The Cultural Center will become a "community garden" for kalo (taro). In addition to teaching families how to grow kalo and make poi, we will introduce a more modern concept for families wanting to grow their food, but who may not have room for a large garden.

The Cultural Center will show families how to build a tower garden. The tower garden is a vertical aeroponic growing system designed to grow dozens of food crops vertically rather like a plant condominium off the ground away from pests and diseases. Each tower is 5 to 8 feet high and can produce dozens of green leafy vegetables. Developers say a tower farm uses 90 percent less water and 20 percent less land than a conventional farm. [redacted] We believe parents are their child's first teacher, and as they help their child learn about STEM, Computational Thinking skills, and relate to agriculture and the land, they will feel empowered to continue teaching them at home. Parents will receive hand-outs of STEM activities to extend learning home with their child. Through the 9 months, a different educational unit will be covered.

All units will incorporate computational thinking. The K-12 Computer Science Framework in consultation with the Computational Thinking Task Force of the Computer Science Teachers Association describes computational thinking as the thought processes involved in solving problems,

specifically problems that can be expressed as steps or algorithms that can be carried out by a computer.[x] Generally, computational thinking is understood to be a combination of four skill categories**: 1- Pattern recognition;** 2) **Creating and Using Algorithms**. **3- Decomposition** and **4- Understanding Abstractions**. To quote award-winning Ann Gadzikowski "…*schools must prepare children to think with creativity, complexity, and logic. The key to building a computer science-literate society is teaching our children computation thinking skills, starting in early childhood.***"** Of the four categories of computational thinking listed above, —pattern recognition, creating and using algorithms, and decomposition are easily integrated into our early childhood curriculum. Understanding abstractions is a particularly high-level thinking skill that most young children are not able to master in preschool, however, introducing those concepts to parents will allow them to make generalizations, help children draw conclusions and use problem-solving thought process that young children cannot see or touch. The theory of child development created by Jean Piaget and known to all Montessori teachers tells us that young children learn through their senses, through movement, and by manipulating tangible objects. [redacted]

[redacted]

[redacted]

Our STEM project incorporating Computational Thinking meets **Competitive Preference Priority 1:** Promoting Science, Technology, Engineering, or Math (STEM) Education, with a Particular Focus on Computer Science. Also, the project includes **Absolute priority (d)** The use of the Hawaiian language in instruction.

[redacted] Numerous schools come to our Culture Center at Keiki O Ka Aina (KOKA) Family Learning Center at Kalihi Valley. However, for many, it is too far to travel from the urban core. [redacted]

ii. The extent to which the project demonstrates a rationale. Waiawa Kai demonstrates a rationale as several key project components included in our logic model are informed by research or evaluation findings that suggest the project component is likely to improve relevant outcomes. The **first component** involves NH families [redacted]

[redacted] The purpose of the *Increased Food Security and Food Self-Sufficiency Strategy*, which was prepared by the Hawaii Office of Planning, Department of Business, Economic Development & Tourism is to increase the amount of locally grown food consumed by Hawaii residents. This will increase food self-sufficiency, which is a component of food security. [xi] According to the strategy, *The Hawaii State Constitution, the Hawaii State Plan, the New Day Plan, Hawaii Comprehensive Economic Development Strategy and other state policy documents support increasing Hawaii's food self-sufficiency. In general, Hawaii has become less food self-sufficient over the past thirty years.* [xii]

A mainland study published by the US National Library of Medicine presented thirty-eight families who enrolled during the pre-garden time, and four more families enrolled during the post-garden period, for a total of 42 families enrolled in the 2009 gardening season. Of the families enrolled during the pre-gardening time, there were 163 household members. The mean age of the interviewee was 44.0, ranging from 21 to 78 years of age. The median number of occupants in a household was 4.0 (range: 2 to 8), Frequency of adult vegetable intake of "Several time a day" increased from 18.2% to 84.8%, ($p < 0.001$) and frequency of children's vegetable intake of "Several times a day" increased from 24.0% to 64.0%, ($p = 0.003$). Before the gardening season, the sum of the frequencies of "Sometimes" and "Frequently" worrying in the past month that food would run out before money was available to buy more was 31.2% and the sum of these frequencies dropped to 3.1% during the post garden period, ($p = 0.006$). The frequency of skipping meals due to lack of money was not statistically significantly different before and after the gardening season for either adults or children. Analysis of text responses and key informant interviews revealed that physical and mental health benefits were reported as well as economic and family health benefits from the gardening study, primarily because the families often worked

in their gardens together. [redacted][ii]

The **second component** of our project is teaching Science, Technology, Engineering, and Mathematics to children ages 3-6 at our Waiawa Cultural Center in a culture-based Agriculture STEM integration that includes Computational Thinking for families with children ages 3-6, as well as to teachers and students in Pre-K-8th grade who come weekly on field trips. "Agriculture is in the STEM paradigm," according to David Acker and Kevin Kimle, both prominent administrative and faculty members at Iowa State University's College of Agriculture and Life Sciences. Penn State's Tracy Hoover, associate dean for Undergraduate Education, and Jean Lonie director of Student Recruitment and Activities agree: "In some ways, agriculture is an umbrella that all the STEM fields fall under. The study of agriculture, food, and natural resources involves biology and genetics, engineering, physics, chemistry, math, geology/hydrology, and other scientific fields." And according to Dr. Neil Knobloch, associate professor and chair of the Purdue Agriculture PK-12 Council, agriculture plays a critical part in helping students in STEM disciplines integrate the skills and material that they are learning, both regarding content and context.[xiv]

[redacted] And the learning will become more relevant as students go outside to explore nature. By asking the right questions, we can help stimulate investigations where students are identifying objects, making comparisons, making predictions, testing ideas, and sharing discoveries, all while observing their natural environment at the Culture Center. Children can also explore sizes, shapes, patterns, and quantities in the process. In this way, children will learn concepts from different disciplines in different contexts, all in ways that are

naturally engaging to them. They will be taught by (30) NH preschool teachers and their teaching assistants will be sent to get their national Child Development Associate (CDA).. Therefore, our project meets **Competitive Preference Priority 2:** Fostering Flexible and Affordable Paths to Obtaining Knowledge and Skills.

c. Quality of project services i. The quality of strategies for ensuring equal access and treatment. The Waiawa Kai Project and partner organizations all have anti-discrimination policies. The attached GEPA 427 statement describes specific practices and policies that KOKA follows to ensure equal access to opportunities, employment, and participation to members of all groups. KOKA makes extraordinary efforts to ensure staffing and participants reflect target communities. [redacted] better support the underrepresented people on the Islands of Hawaii, working to improve every aspect of life for children and families.

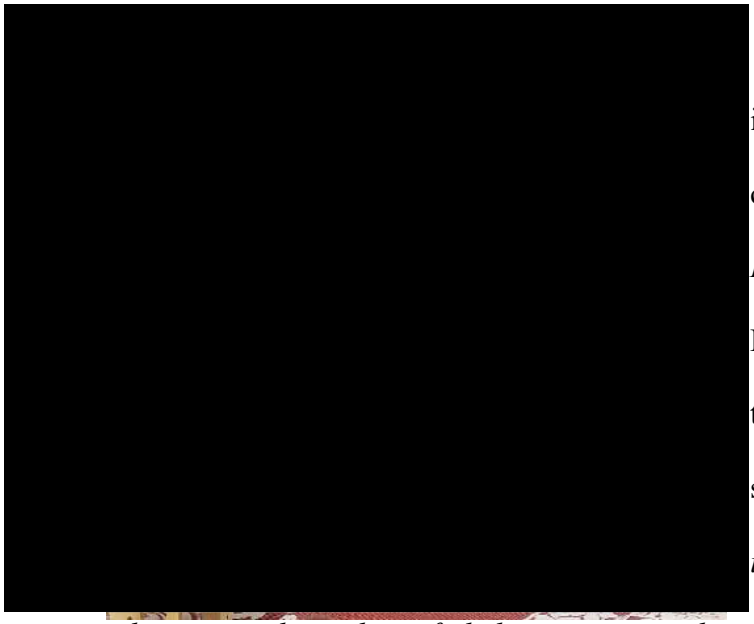
ii. The extent to which the services reflects up-to-date knowledge. [redacted] We know from a study by the Office of Hawaiian Affairs: Measuring Native Hawaiians Participating in Cultural Activities in Percent through December 2018 that: Native Hawaiians are cognizant that our identity, our way of life, our language, and our practices are truly unique to our everyday lives. Many vital and integral elements of our traditions, practices and cultural assets face imminent extinction as daily practices; its knowledge and its loss would be irreplaceable; especially as our elders who have the *ike* (gift) pass the veil to join their ancestors. The loss of land, water, family structure, restrictive or dismantling of native rights also affects and impacts these practices. These practices, particularly the language, are unique due to native speakers and revitalization at an educational level.[xv] Our Cultural Center will provide an appropriate location for our people to engage in cultural practices, connect with

their heritage, and learn to once again live with the land. Native Hawaiian children are the keepers of our culture, speakers of our language and leaders of our future. The Cultural Center will give them a place to learn about their culture and language from our elders, and to learn STEM from our science teachers.

[redacted] Growing food in community and home gardens can provide people with more access to fresh vegetables for a healthier food supply, according to a new study conducted by the University of California and Santa Clara University. Researchers surveyed people in San Jose who maintained a garden in their yard or a community garden and found that: *gardeners consumed more vegetables when they were eating food grown in their gardens.* Participants in the pilot study, published in California Agriculture journal, reported doubling their vegetable intake to a level that met the number of daily servings recommended by the U.S. Dietary Guidelines. Meals rich in fresh fruits and vegetables are lower in calories and higher in fiber and part of a healthy diet. UC Cooperative Extension surveyed 85 community gardeners and 50 home gardeners in San Jose. The gardeners surveyed were generally low-income and came from a variety of ethnic and educational backgrounds. By growing their food, home gardeners saved on average $92 per month and community gardeners saved $84 *per month.*[xvi]

[redacted]. A new study, conducted by Frontiers in Psychology in January 2018 had these results regarding teaching children outdoors: *When teachers offer lessons in relatively natural settings, students may benefit in several important ways. Academically, some evidence suggests students retain more after lessons in nature in biology*

and math (Fägerstam and Blom, 2012), language arts, social studies, and science more generally (Lieberman and Hoody, 1998) than after similar lessons indoors. Lessons in nature may also offer other benefits associated with exposure to trees, gardens, parks, and wildlife, including physical activity, stress relief, and the rejuvenation of attention (for reviews see Chawla, 2015; Kuo, 2015). Furthermore, as anthropogenic climate change becomes an increasingly pressing issue, lessons in nature may help build the next generation of environmental stewards…" Stewarding or to malama–to take care of the land that feeds and gives life, is one of the greatest cultural values to Native Hawaiians. The article continues… *positive childhood nature experiences appear to play a key role in fostering pro-environmental behavior in adulthood (Monroe, 2003).*[xvii]



It is also important to educate indigenous children within the context of their culture. *The Call for Cultural Relevance in Education* by Shawn Malia Kana'iaupuni and Brandon C. Ledward present conclusions from the Hawaiian Cultural Influences in Education study: *In terms of broader policy and program implications, it is apparent that recent national education policies have failed to recognize the importance of language and culture for native children.* Yet the consequences of this failure are significant and replete in the well-worn trail of low achievement, low socioeconomic status, and poor health of this nation's indigenous populations. One size fits all education models make no sense at the community level, where scripted approaches could be replaced by those that harness the wonders, the fullness, and the richness of cultural practices, values, and knowledge. These factors have yet to be fully leveraged

and supported in the educational process. ***There must be room for communities to guide the education of their children to ensure relevance and meaning in both outcome and substance.*** The Waiawa Kai Project is a similar community effort.

iii. <u>The likely impact of the services to be provided</u>. The data concerning the strategies to be used in the project provides evidence that the proposed [redacted] ment of Native Hawaiian children, and in turn close achievement gaps and later quality of life**.**

Anticipated outcomes include the following [redacted] If funded, many of these trained staff comprise the core staff of the Waiawa Kai project. To continue to support diversity, when KOKA advertises and interviews for available positions, a form for all applicants to sign indicating that KOKA does not discriminate in hiring practices or program enrollment is included. All agency literature for recruitment, flyers, brochures, ads, PSAs etc. specifically states

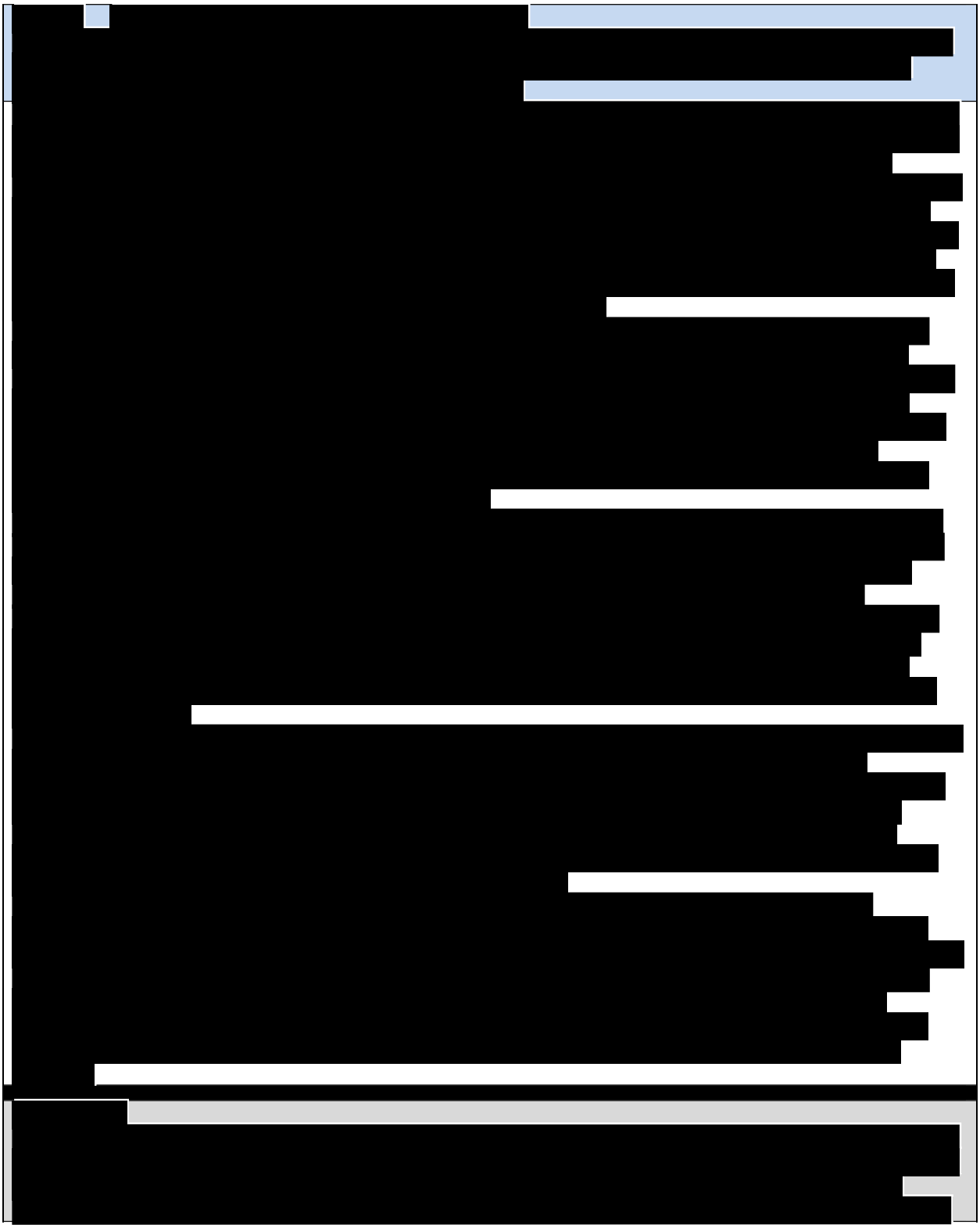
that KOKA does not discriminate based on race, color, national origin, gender, age, or disability. This information is also stated in the KOKA Employee Handbook. All child and youth programs are inclusive, registering children with differing abilities. KOKA staff and participants are diverse in terms of age, ability, ethnicity, age, and gender. The agency has a designated Equal Opportunity Officer to monitor policy compliance.

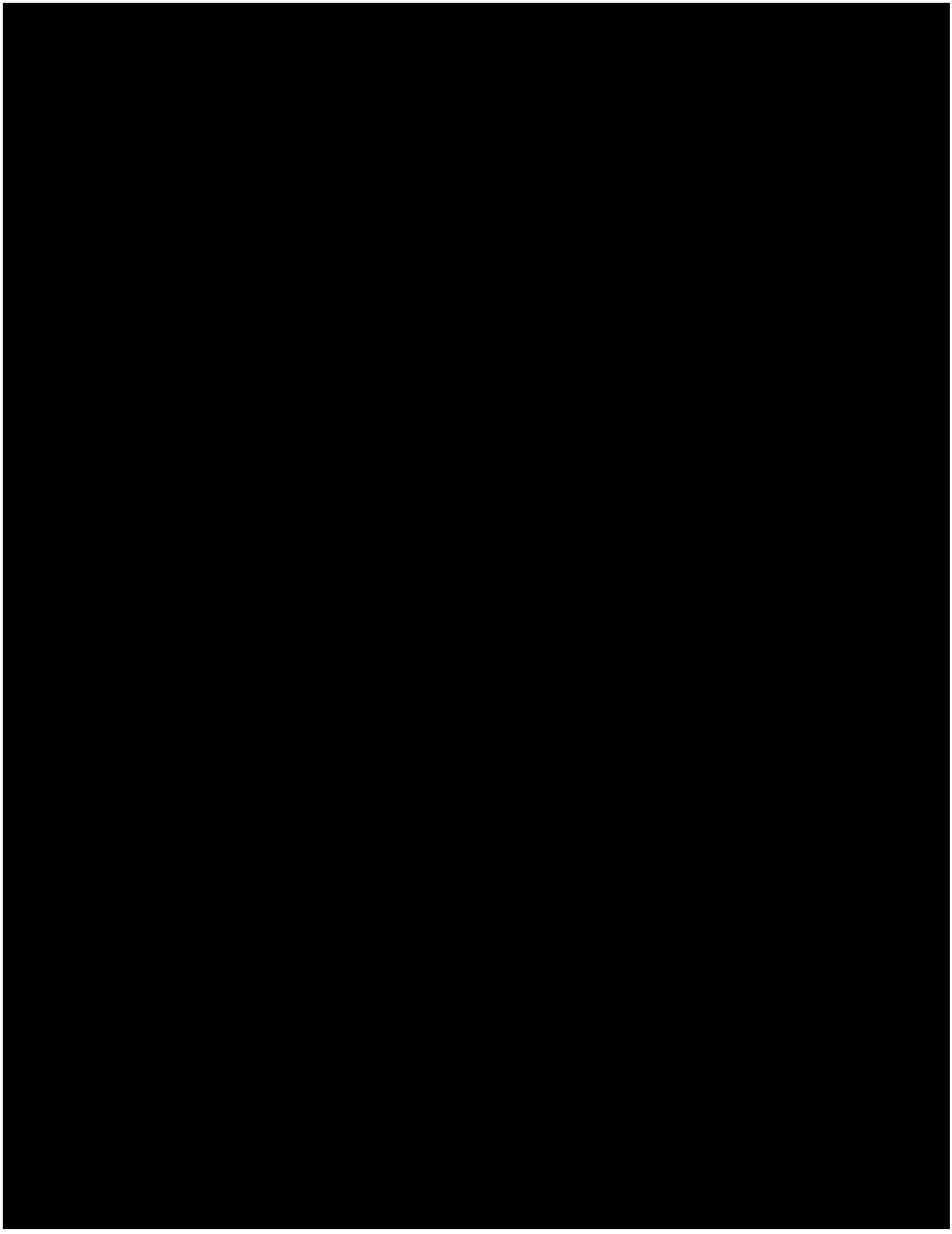
ii. <u>Qualifications and experience of key project personnel.</u>

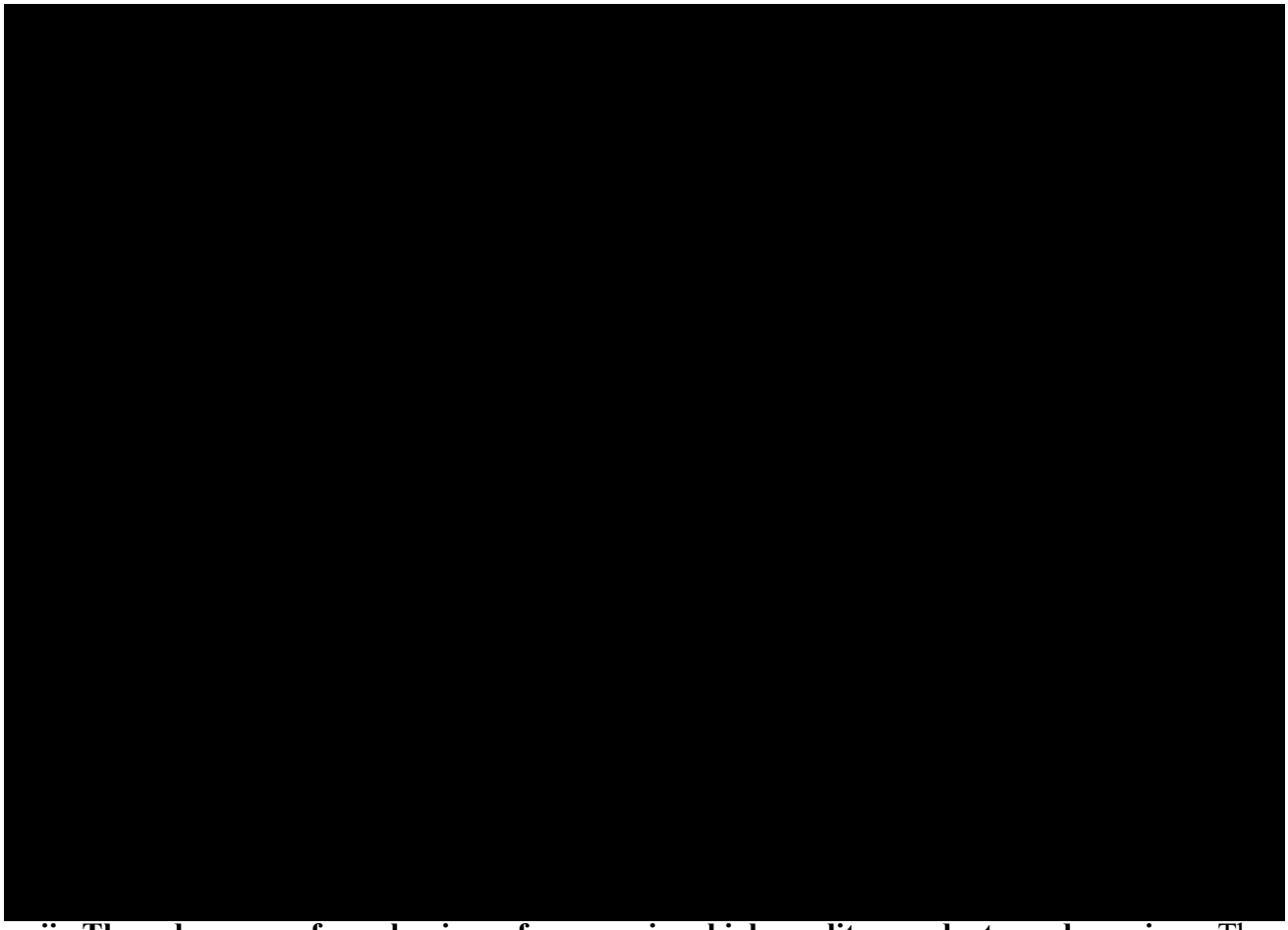
Table 1 Waiawa Kai Project - Key Staffing Plan

[redacted]	[redacted]

e. Quality of the management plan: i. **<u>The adequacy of the management plan to achieve the objectives of the project</u>**.







ii. The adequacy of mechanisms for ensuring high-quality products and services. The Performance Matrix presented above helps us to monitor Waiawa Kai for high-quality. It includes clearly defined tasks, responsibilities for accomplishing tasks and targeted milestones. Members of the KOKA management team are trained in Dr. W. Edwards Deming's Total Quality Management (TQM). The Plan–Do–Check–Act cycle is a four-step model for carrying out change. The **PDSA cycle** for Waiawa Kai consists of:

[redacted] 3. **Study:** The Waiawa Kai team will analyze the data collected monthly and make any necessary changes. 4.**Act:** We will then implement changes and begin the cycle again to ensure data-driven decisions in this continuous cycle of improvement.

KOKA completes an A133 audit annually. In the past 25 years, [redacted]

[redacted] **of the project evaluation: i. <u>Methods of evaluation provide reliable performance data on relevant outcomes.</u>** KOKA is well-positioned to implement and evaluate the effectiveness of activities and services in addressing the needs of Native Hawaiian communities through an Outcome Evaluation. All targets for key activities and services are captured in the Logic Model on page 25. Each target was based on reasonable estimates, which incorporate data on the past performance of similar programs implemented by KOKA within Native Hawaiian communities. Due to KOKA's experience with the evaluation of similar programs, the evaluation plan itself is reasonable, achievable and appropriate. The Evaluation Committee is comprised of the Project Director, the External Evaluator, a Research and Evaluation Department Staff Member, the Education Director, two Waiawa Kai Parents, and two project Facilitators. The Evaluation Committee supports the development, implementation, and continuous management of the evaluation. Also, the Evaluation Committee will support the hiring of the proposed External

Evaluator. [redacted]

Project-specific indicators: [redacted] Together, the Logic Model, performance measures, measurement of the fidelity of program implementation and collection of outcome data (both quantitative and qualitative) will help determine (and operationalize) the threshold for acceptable and successful program implementation to achieve desired outcomes. The participatory and utilization-focused evaluation approach ensures regular, timely, and useful feedback so project staff can make data-informed decisions- regarding program changes. Please see Performance Matrix on page 19 for specific indicators.

When various types of data will be collected. [redacted]

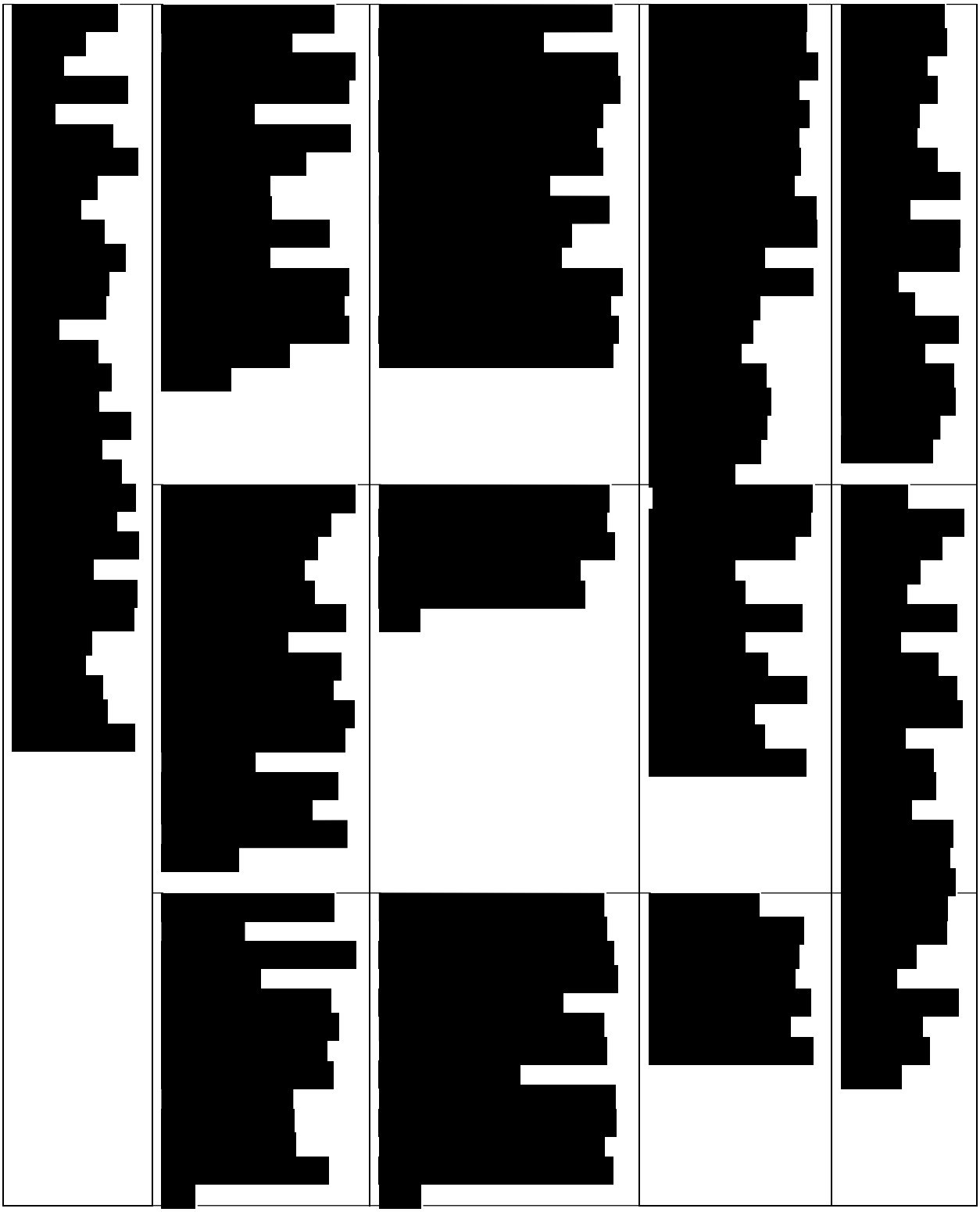
What methods will be used. The KOKA CQI Team will use both qualitative and quantitative data to guide decision-making through the PDSA cycle of continuous improvement.

What instruments will be developed and when. [redacted]

How the data will be analyzed. Our **Outcome Evaluation** will be a systematic process of collecting, analyzing, and interpreting information to determine the extent to which the project is effective. The ongoing evaluation will provide feedback on the effectiveness of the project and its components as we follow the PDSA model. Our previously mentioned evaluator will take the lead in data analysis monthly.

When reports of results and outcomes will be available. Waiawa Kai will submit quarterly, semi-annual, and an annual performance report (APR) that will demonstrate progress in meeting Project objectives, financial reports, and performance measurement data. The project will also submit the same reports annually to the Native Hawaiian Education Council.

KOKA uses data to monitor progress and provide accountability information at the site and strategies for replication in other settings. [redacted]



Keiki O Ka Aina Family Learning Centers
Waiawa Kai: An Agriculture and STEM Integration for Healthy Hawaiian Families

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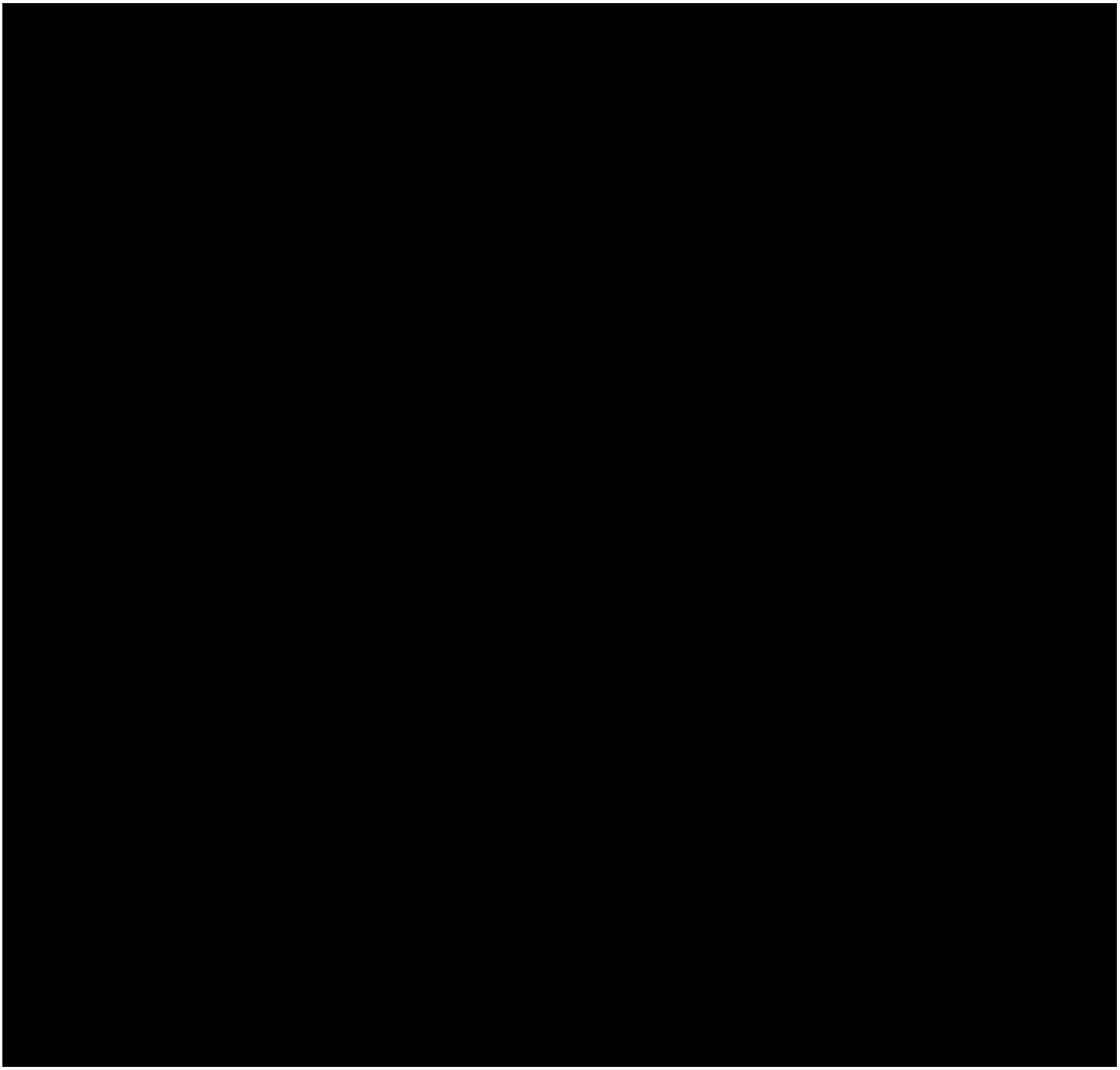

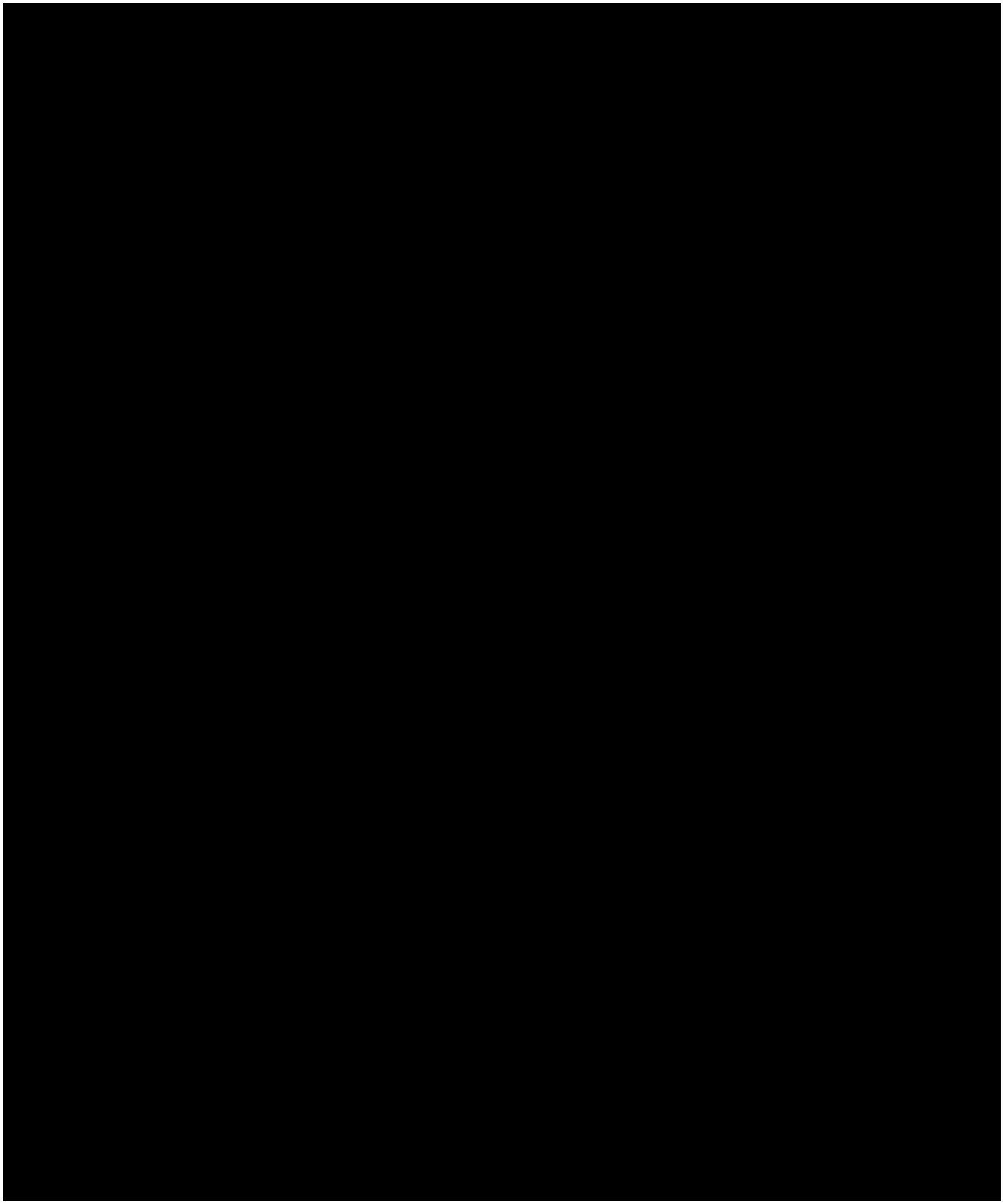

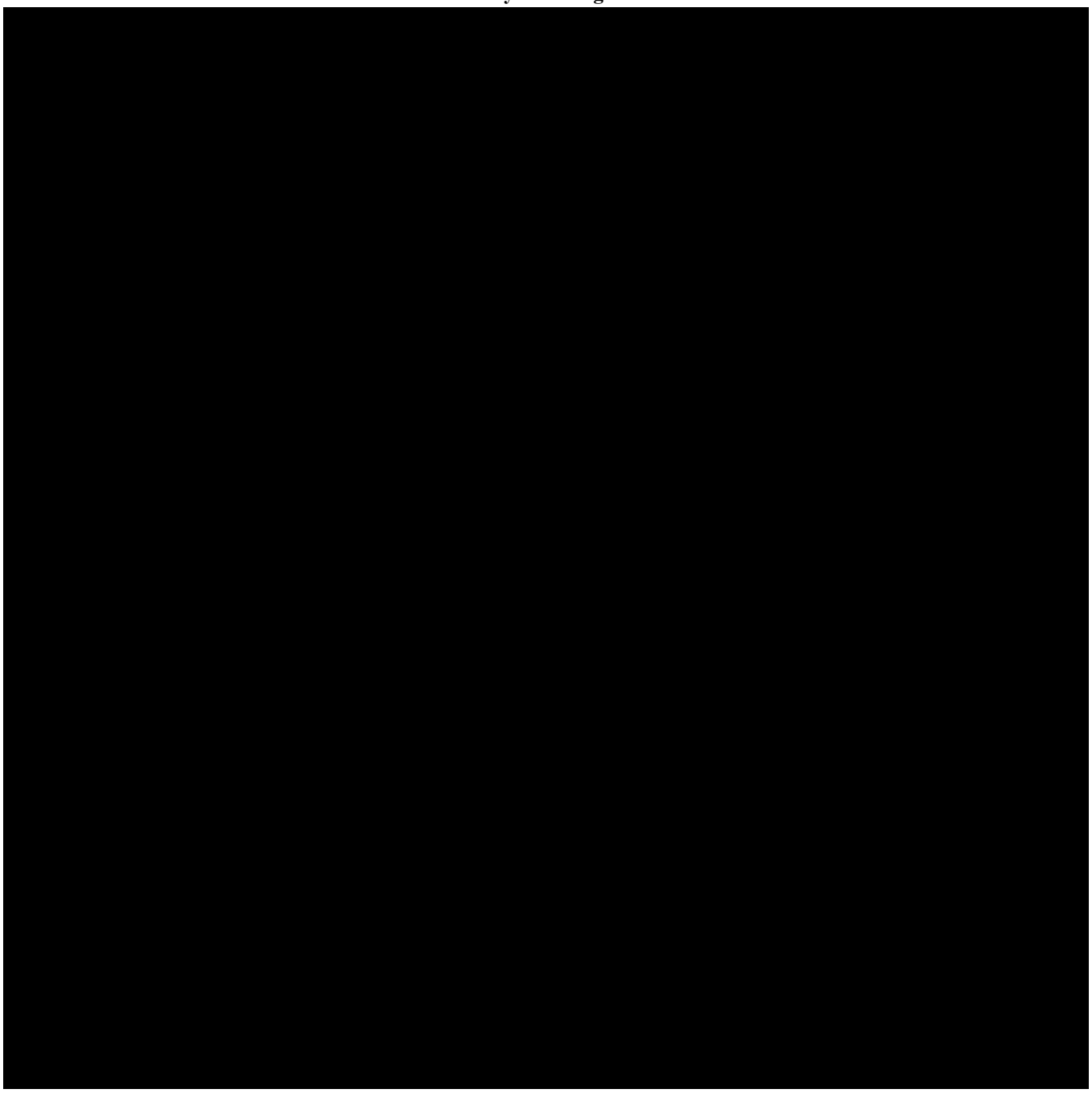

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[ii] March 2018 Research and Economic Analysis Division Department of Business, Economic Development and Tourism STATE OF HAWAII files.hawaii.gov/dbedt/economic/reports/SelectedRacesCharacteristics_HawaiiReport.pdf

[iii] http://ohadatabook.com/DB2013.html (Viewed January 15, 2020).

[iv] http://www.hawaiihealthmatters.org/indicators/index/view?indicatorId=1247&localeId=14 (Viewed January 15, 2020)

[v] Ellen Ruppel Shell, New World Syndrome. Atlantic Monthly, June 2001 (Viewed January 15, 2020)

[vi] Food Independence Could Be a Matter of Survival for the U.S.' Most Isolated State http://www.takepart.com/article/2015/06/29/hawaii-local-food/ (Viewed January 15, 2020)

[vii] Ibid

[viii] Page, C., Bony, L., Schewel, L. Island of Hawaii Whole System Project Phase I Report. Rocky Mountain Institute, 2007. (Viewed January 15, 2020)

[ix] https://studylib.net/doc/18802049/food-and-agricultural-education-in-the-united-states (January 15, 2020)

[x] https://k12cs.org/computational-thinking/ (Viewed on January 17, 2020)

[xi]http://files.hawaii.gov/dbedt/op/spb/INCREASED_FOOD_SECURITY_AND_FOOD_SELF_SUFFICIENCY_STRATEGY.pdf (viewed January 2020)

[xii] Ibid

[xiii] Impact of a Community Gardening Project on Vegetable Intake, Food Security and Family Relationships: A Community-based Participatory Research Study https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3661291/

[xiv] https://agfundernews.com/agriculture-putting-steam-stem-studies-university.html (January 15, 2020)

[xv] https://dashboard.hawaii.gov/stat/goals/r4bw-tgt3/dyd5-s6m4/35dh-m2kq (viewed January 17, 2020)

[xvi] Urban gardens improve food security Pam Kan-Rice, UC ANR 2016 https://www.universityofcalifornia.edu/news/urban-gardens-improve-food-security (January 17, 2020)

[xvii] Front. Psychol., 04 January 2018 | https://doi.org/10.3389/fpsyg.2017.02253 (January 17, 2020)