JLSC

ISSN 2162-3309 | JLSC is published by the Iowa State University Digital Press | http://jlsc-pub.org

**Volume 11, 1 (2023)**

# A Critical Survey of Open-Access Policies in US Land Grants

Sarah Potvin & Wendi Arant-Kaspar

Potvin, S. & Arant-Kaspar, W. (2023). A Critical Survey of Open-Access Policies in US Land Grants. *Journal of Librarianship and Scholarly Communication*, 11(1), eP15605. https://doi.org/10.31274/jlsc.15605

This article underwent fully anonymous peer review in accordance with JLSC's peer review policy.

ISSN 2162-3309 10.31274/jlsc.15605

RESEARCH ARTICLE

# A Critical Survey of Open-Access Policies in US Land Grants

Sarah Potvin
*Texas A&M University*
Wendi Arant-Kaspar
*Texas A&M University*

**ABSTRACT**

**Introduction:** Land-grant universities in the United States and the international open-access (OA) movement both purport to advance public access to knowledge and assert a public benefit to doing so. The objective of this study was to test the hypothesis that land-grant universities would have a high rate of adoption of institutional OA policies. To date, no study has looked at OA approaches or policies across the land grants.
**Methods:** This study considers the critical literature on both land-grants and OA, surveys land-grant institutional OA policies, and analyzes relevant demographic and financial data.
**Results:** The study identified 15 mandates and 4 resolutions across the diverse institutional types and populations represented in the 112 land-grants. None of the 21 historically Black colleges and universities or 35 tribal colleges and universities among the land-grants have adopted OA policies.
**Conclusion:** Despite shared objectives, land-grant colleges and universities have not systematically embraced OA, and relatively few have adopted institutional OA policies. In the context of profound, institutionalized inequities among the land-grants, and attentive to the potential of OA to deepen existing inequities, this study considers the causes of and implications for low institutional OA policy adoption among land-grants.

**Keywords:** open access, public access, policy analysis, land-grant universities, historically Black colleges and universities, tribal colleges and universities, traditionally White institutions, equity

*Received: 07/28/2022 Accepted: 01/25/2023*

## IMPLICATIONS FOR PRACTICE

1. Advocates for institutional open-access (OA) policies should be aware of the tendency of these policies to perpetuate advantages and magnify disparities in research impact. Further research is needed to understand the ramifications of institutionally driven and institutionally managed OA, including investigations into the relatively low uptake of these policies in institutions founded to advance public access to research in the United States.
2. Race and racism have been, and remain, central drivers of institutional formation in the United States. Analyses of institutional policies or institutional research impact must grapple with this history, its legacy, and the persistence of inequities and racialized institutions in higher education.
3. Further research is needed to understand why institutional OA policies and resolutions have not been adopted by historically Black colleges and universities (HBCUs) or tribal colleges and universities (TCUs). Interventions and targeted resources may be required to ensure that researchers based at HBCUs and TCUs are not disproportionately excluded from scholarly dissemination or opportunities for research, with accompanying effects on research impact.
4. Findings may inform the approaches of scholarly communication professionals based in land-grants working institutionally or collectively to advance public access to scholarship.

## INTRODUCTION

The United States has federally supported public access to higher education, in the form of research, teaching, and extension, since the 1860s, with the passage of the Morrill Act and the designation of land-grant universities and colleges. Today, every US state and territory hosts at least one land-grant university. One hundred and forty years after the Morrill Act, as digital technologies enabled new access paradigms, the international open-access (OA) movement made a complementary commitment, coalescing around a goal of removing price and permission barriers to scholarly literature and promoting free, online access to research. In the United States, in the absence of a federal mandate, OA has progressed in fits and starts, operationalized through OA policies adopted by federal agencies, private funders, universities, colleges, and institutes, as well as the uneven shifting of researcher norms, reflected in movements toward open publication venues.

After briefly reviewing the history of land grants and OA policies in the United States, this article will analyze the adoption of institutional OA policies (IOAPs) in land-grant institutions. Informed by critical literatures on land-grants and OA and data on institutional

characteristics, including funding, resources, status, and demographics, the study will pose questions about the causes and implications of a low IOAP adoption rate among land-grants and provocations for potential next steps for research and practice.

## The establishment and evolution of land-grants

The Morrill Act of 1862 (7 U.S.C. § 301 et seq.), the first of three federal land-grant acts, endowed federal lands to states for establishing public universities. These lands, totaling almost 11 million acres, represented a subset of the 2 billion acres seized by the United States through the violent dispossession of Indigenous populations (Lee & Ahtone, 2020). Passed during the Civil War in a fractured Congress that did not include the 11 seceded Confederate states, the Morrill Act positioned land-grant universities "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life" (Morrill Act of 1862). Land-grant universities emphasized military, agricultural, and mechanic arts instruction but acknowledged a more extensive curriculum. As the Association of Public and Land-Grant Universities (APLU) claims, the Morrill Act "was intended to provide a broad segment of the population with a practical education that had direct relevance to their daily lives," with land-grant institutions assuming the responsibility to steward teaching and research efforts to benefit the public (APLU, n.d.). Founded, provisioned, or incorporated under an appeal to both educational access and economic development, land-grants are widely perceived to have created more accessible, practical educational opportunities and advanced the national economy at a crucial moment (Feir & Jones, 2021).

Endowed by federal lands but controlled by state legislatures, land-grants are heterogeneous. Subsequent to the Morrill Act, which emphasized teaching, federal legislation built out the tripartite mission of the land grants to include research and extension. Federal funding appropriated by the Hatch Act of 1887 (7 U.S.C. 361a et seq.) hastened land-grants' transformation into research institutions and formalized support for research with the potential for practical application through the establishment of agricultural experiment stations affiliated with each land-grant. Land-grant historians Sorber and Geiger (2014, pp. 386-387) describe continuous tension in the 19th century as land-grant institutions, having embraced several different institutional models and emphases, "tried to reconcile research university ideals with Morrill Act commitments to access, utility, and agricultural uplift." This tension was not quieted until the passage of the Smith-Lever Act of 1914 (7 U.S.C. ch. 13 § 341), which affirmed the public outreach mission of the land-grants by establishing the Cooperative Extension Services system. The Smith-Lever Act formalized the land-grants' commitment "to disseminate agricultural college-generated knowledge beyond the campus to farms and consumers." Different levels of government facilitated this collaborative effort: the federal government, through the US Department of Agriculture (USDA), and county governments taking on extension

agents (National Research Council, 1995). As proponents of land-grants argue, the Smith-Lever Act "created the very first impetus for institutions of higher learning to engage with members of the community, incentivizing university personnel to leave the confines of their campuses … and work among the public at large" (Gavazzi & Gee, 2018, p. 40). Sorber and Geiger observe that Smith-Lever "allowed land-grant institutions to differentiate missions: to promote the university values of high academic standards for traditional-age students and disinterested scholarship among faculty; offer accessible, practical education for nontraditional students (and community members) through irregular course offerings and educational outreach; and engage directly with farm and rural community problems" (2014, p. 387). More recently, additional legislation has established federal funding protocols for research at land-grants and recognized funding eligibility for institutions such as non-land-grant colleges of agriculture and Hispanic-serving agricultural colleges and universities (Croft, 2019).

At their founding, many of the 1862 land-grants limited enrollment to White men. Legislation in 1890 (The Morrill Act of 1890; 26 Stat. 417, 7 U.S.C. § 321 et seq.) and 1994 (The Equity in Educational Land-Grant Status Act; P.L. 103–382 § 531–535) addressed racial segregation in the land grants by prioritizing education for Black and Indigenous people, extending land-grant status and funding to historically Black colleges and universities (HBCUs) and tribal colleges and universities (TCUs). Even as these acts prioritized those excluded by the 1862 institutions, it institutionalized their exclusion. The 1890 act, which provisioned additional federal funding to states for land-grants from the sale of public lands, was an intentional effort to spur access to education for Black American individuals barred from Southern land-grants by segregationist admissions policies. Rather than mandating the repeal of discriminatory policies, the Act allowed Southern states to maintain Whites-only land-grants and designate separate institutions to serve Black students. These 1890 land-grants, which became the first HBCUs, were called to "be all things to all people" in serving a recently emancipated population with meager access to schooling, and only began to establish collegiate programs in the 20th century (Humphries, 1991).[1] The 1890 land grants were further limited by their lack of access to or eligibility for state or federal funding comparable to the 1862 land grants, contributing to what Seals (1991, p. 34) describes as "the vast policy vacuum for 1890 land-grant colleges and their natural clients, African-American farmers."[2]

[1] For a discussion of competing models for Black education and the 1890 land-grant act's contributions to technical and industrial education at the expense of liberal arts, see Allen & Jewell, 2002.

[2] Seals further argues that the Hatch and Smith-Lever Acts served as "the pillars of land-grant institutional segregation policy in this country on both federal and state levels." See Seals, 1991, p. 34.

With the 1994 Equity in Educational Land-Grant Status Act, the federal government established endowment funds and annual appropriations in lieu of land-grants for 35 TCUs, with funds targeted to agricultural science educational enhancements, extension programming, and capital facilities (Phillips, 2003). TCUs are young, unique institutions in the United States, first established in the late 1960s as part of the civil rights movement and aligned with the community college model, with a goal of empowering tribally controlled higher education (Boyer, 2015). Their designation as land-grant institutions ensured federal funding for TCUs serving a "dual mission" of vocational instruction and cultural renewal. As Boyer (2010, p. x) argues, TCUs, having joined the land grants and grown out their campuses and programming (incorporating four-year and graduate programs), are "… demonstrating a willingness to more aggressively assert their identities as Native institutions created for the purpose of strengthening Native nations." Throughout the years, new institutions have been recognized as land-grants under the 1862, 1890, and 1994 acts, and some have been removed.[3]

Tangibly, whereas the 1862 and 1890 land-grants typically host the full range of academic programs anticipated in a research university, the land-grant mission remains irrevocably linked to engineering, agriculture, and affiliated areas of study, which continue to signal practical, economic benefit. Agricultural research, education, and outreach persist as "[t]he single area in which land grants dominate, and with which they are uniquely identified…" (Sorber & Geiger, 2014, pp. 412-413). The agricultural dominance of land-grant universities extends to their veterinary education and research programs. As a 1995 report explained, colleges of agriculture and veterinary medicine housed in land grants share "actual and potential" links, including investments in animal health and USDA research funding (National Research Council). Land-grant universities host 25 of the 30 accredited colleges of veterinary medicine in the United States. Tuskegee University, which was granted land-grant status in 1972, is the only HBCU that hosts a fully accredited college of veterinary medicine.

## The development of OA

The international OA movement advocates to make scholarly literature "digital, online, free of charge, and free of most copyright and licensing restrictions" and to transform a "deeply dysfunctional" and restrictive system of scholarly communication (Suber, 2012 p. 4, 29).

[3] The literature on land-grants rarely acknowledges tribal colleges. Sorber and Geiger's 2014 land-grant historiography mentions tribal colleges only once, as one of several examples of land-grant designations expanding beyond its early history, emulated through programs like Sea and Space Grants. Within the tribal college literature, there is some documentation of the decades of work behind garnering land-grant status, including negotiations with a reluctant Association of Public and Land Grant Universities (Shreve, 2019).

This movement seeks to remove the economic and legal barriers to information dissemination while ensuring that authors preserve "control over the integrity of their work and the right to be properly acknowledged and cited" (Ibid., p. 7). As Tennant et al. (2016) argue, there are clear public and societal benefits associated with OA, as well as benefits in the forms of citation advantages to researchers. One area of potential overlap between these beneficiaries is "the non-academic dissemination" of research to a general audience (Tennant et al., 2016, p. 1). OA advocate and theorist Suber (2012, p. 13) acknowledges that OA aligns the public interest with scholars' self-interest, writing that scholars are incentivized to produce work that they will be rewarded for according to the "engineered fact of life in the academy," where the advancement of knowledge converges with opportunities for promotion.

In the United States, in the absence of a unified federal mandate, OA has gained momentum through different channels. In 2008, significant public and private OA initiatives were implemented, notably the National Institutes of Health (NIH)'s Public Access Policy mandate and Harvard University's passage of an OA policy by its Faculty of Arts and Sciences. The former, which built on a 2005 NIH policy that merely encouraged OA, ushered in a wave of agency mandates requiring that federally funded research be made OA; the latter set precedent for faculty members' advancing OA through the contribution of scholarly articles to institutional repositories and influenced the passage of dozens of IOAPs that committed to making research output accessible to the public free of charge or restriction. The practice promoted in the Harvard policy, depositing scholarly publications in an OA repository, is known as green OA.[4]

Although this article will primarily focus on the passage of policies by universities, OA to scholarly works has also been advanced through a myriad of actions, including private funding agencies' policies, dedicated advocacy, the development of specialized publishing tools and services, and negotiations by university libraries, publishers, and societies that have "flipped" portions of the scholarly literature open. Both funding agency mandates and institutional policies have been celebrated as transformational and criticized as ineffectual: necessary but insufficient mechanisms for making scholarly output in the United States openly accessible (Zhang et al., 2015). Mittell (2013) describes institutional policies as "termite reforms, creating modest but long-lasting change beneath the surface, burrowing through traditional practices without proclaiming their own grandeur." Additional critiques of OA have examined

[4] A competing and sometimes complementary approach, gold OA, advocates for publishing journal articles, monographs, and other scholarship directly in OA venues such as dedicated journals. Gold OA is further differentiated by two models: author pays OA, in which authors subvent OA publication of their articles through article processing charges, sometimes supported by institutional or funded commitments to cover these costs; and platinum, diamond, or no pay OA, a "free to read, free to publish" model of direct OA.

the movement's shortcomings, divisions, and potential for contributing to and exacerbating inequities in research and higher education.[5] Calling for a decolonization of OA, Meagher (2021, p. 341) describes how, in a landscape of fracture, fragmentation, and polarization around optimizing equitable access via OA, "tensions have emerged that reveal a more equivocal relationship between forms of OA and the global public good."

Increasingly, OA scholars are attentive to deep inequities in scholarly production that the movement has inadequately addressed, as well as the movement's reification of scholarly publishing models, which amounts to an endorsement of commercial publishing interests. Writing in 2014, Kansa warned OA advocates that their tactic of aligning arguments for OA with the Neoliberal interests of "the heads of foundations, businesses, governments and universities" should not be confused with a strategy for reform that brings about a more equitable distribution of wealth and power in universities and larger society. As Albornoz et al. (2020, p. 65) argue, "… open research practices or 'openness' - when decontextualized from their historical, political, and socioeconomic roots – rather than narrowing gaps, can amplify the over-representation of knowledge produced by Northern actors and institutions and further the exclusion of knowledge produced by marginalized groups. In other words, open systems may potentially replicate the very values and power imbalances that the movement initially sought to change."

Kiesewetter (2020, p. 113-114), attentive to problems with OA policies, observes "Funder and policy-based [open access] strategies largely follow the profit- and efficiency-driven logics and the globalising scope of the neoliberal university," elaborating that this approach "negates the work of scholars and institutions that are not able or willing to conform to its calculative and individualising logics." Efforts such as the Radical Open Access Collective have sought to organize alternatives to commercially dominated OA by supporting models of scholar-led, non-profit open scholarship (Adema & Moore, 2018). Belying the peculiar incentives of academia, critiques of OA are published behind paywalls in journals hosted by Elsevier, Wiley, and other highly profitable publishers (The Editors, 2021). Increasingly, analyses of OA, open science, and allied movements have documented their potential to contribute to and deepen existing inequities in research and higher education, leading to a "cumulative advantage" for well-resourced researchers (Olejniczak & Wilson, 2020; Ross-Hellauer et al., 2022) and the

[5] Pay-to-publish models of gold OA have earned criticism for their perpetuation of both commercial publishing monopolies and advantages in publishing conferred to authors at wealthier institutions that cover publication costs. As Olejniczak and Wilson (2020, p. 1429) find in a large-scale data analysis, "the likelihood for a scholar to author an [gold or hybrid] OA article increases with male gender, employment at prestigious institution ([Association of American University] member universities), association with a STEM discipline, greater federal research funding, and more advanced career stage (i.e., higher professorial rank)."

perpetuation of epistemic injustice (Shorish & Chan, 2019; Albornoz et al., 2020; Morales & Williams, 2021).

## LITERATURE REVIEW

The authors reviewed the scholarly literature on OA, attentive to studies of policy adoption, motivations for public access, and attitudes toward OA in public institutions, including land-grants, HBCUs, and TCUs. No dedicated studies have examined OA policies in land-grants, HBCUs, TCUs, or public universities, although some include these institutional categories in their analysis.

Multiple studies analyze the development and uptake of IOAPs in the United States. Academic libraries have often been instrumental in the promotion and passage of these policies, as is reflected in coverage in the library and information science (LIS) literature. The LIS literature includes voluminous coverage of the full range of OA, open science, and open data issues affecting scholarly communication, technical services, copyright, and collection development. A subset of this literature considers IOAPs in the United States; the formal literature on this topic is supplemented by extensive informal information sharing via institutional and personal websites, shared efforts represented by organizations such as the Coalition of Open Access Policy Institutions (COAPI), conference presentations, and listservs.

Fruin and Sutton (2016) rely on survey data to provide a detailed overview of institutions that had adopted or considered adopting IOAPs. Their article presents extensive data on institutional characteristics, including governance models; policy types, which range from opt-in resolutions encouraging researchers to publish OA to opt-out policies that assert institutional rights to make research output openly accessible; and faculty concerns and outreach strategies. Fruin and Sutton's survey included a question about land-grant status, accounting for 16/51 respondents. Eight institutions, five with adopted IOAPs and three then in the process of promoting adoption, affirmed that their outreach about the importance of OA included the assertion "open access supports the institution's land grant mission" (Fruin & Sutton, 2016, p. 475).

A growing literature considers the impact of IOAPs. In their review of self-archiving OA policies adopted by institutions and funding agencies, Xia et al. (2012, p. 86) focus on compliance, concluding that policies themselves are insufficient: "Policy compliance will approach full participation only if the entire scholarly communication system is adjusted." Kipphut-Smith et al. (2018) observe that institutions with OA policies struggle to consistently assess compliance and recommend both transparency and the development of adaptable community standards for measuring compliance. Examining the effects of the University of California (UC)'s OA policy, Mitchell (2016) argues that full policy compliance is "a narrow and arbitrary

definition of success that relies entirely and exclusively on the metrics of policy participation to gauge effect." Detailing how compliance has improved drastically since UC moved from a deposit model dependent on faculty self-submission to an automated approach, Mitchell advocates for alternative measures of impact, including evidence of greater visibility for deposited articles, feedback from unaffiliated researchers and practitioners appreciative of access to UC scholarship, and UC authors' retention of more systematic and consistent rights, via the university license, when publishing commercially (Mitchell, 2016).

Detailed institutional case studies of IOAPs reflect on the interplay of outreach, policies, campus environments, and the role of library staff in achieving the passage of IOAPs or promoting compliance with these policies (Rosenblum, 2010; Emmett et al., 2011; Smith, 2012; Mullen & Otto, 2014; Finnie Duranceau & Kriegsman, 2016; Otto, 2016; Soper, 2017; Cantrell & Johnson, 2018). In addition to providing context and lessons learned, these case studies impart recommendations to institutions seeking to implement policies or adjacent services. Other studies attempt to synthesize across case studies. Finnie Duranceau and Kriegsman (2013) interviewed key staff at six institutions that had adopted a "Harvard-style," permission-based OA policy (Harvard University, the Massachusetts Institute of Technology [MIT], Columbia University, Duke University, Oberlin College, and the University of Kansas) and analyzed these cases to establish a set of recommended "common practices" for libraries supporting OA deposit.

The literature on OA in the 1890 and 1994 land-grant institutions is strikingly sparse; this scarcity extends to literature that might look at all HBCUs (numbering 100 as of 2019, of which 21 are land grants). Observing that "there is no research that specifically focuses on librarians of Historically Black Colleges and Universities and their interactions with Open Access venues," Evans (2012, p. ix) applied a mixed methods approach to assess HBCU librarians' attitudes toward OA. Evans's doctoral dissertation study identified an "opportunity gap" between HBCU librarians' interest and awareness in OA and the obstacles that they face in putting OA into practice in their institutions.

The authors were unable to locate any literature that examines OA initiatives in TCUs. TCUs are typically tribally chartered and overseen by one or more sovereign Tribal Nations, although some are federally chartered and operated by the Bureau of Indian Education in the US Department of the Interior or through other governance structures (Crazy Bull et al., 2020). Historically, TCUs have operated as teaching colleges dedicated to educating and providing economic opportunities to predominantly American Indian students, with a unique mission to "rebuild, reinforce and explore traditional tribal cultures" (American Indian Higher Education Consortium & The Institute for Higher Education Policy, 1999, p. A-3). TCUs have taken steps to grow out research programs, including through federally sponsored

initiatives, partnerships with other universities, and efforts to forge a TCU engineering initiative, but encounter barriers in institutional capacity, community awareness, and faculty support in doing so (Riley et al., 2017). Although there is no literature on OA in TCUs, research into Indigenous systems and theories offer alternatives to the paradigms of ownership and individual property enshrined in intellectual property law and, by extension, OA (Kelley, 2007; Christen, 2012; Reed, 2020).

Researchers have examined whether scientists at land-grant universities are more inclined toward public access in their beliefs and practices. Surveys of agricultural researchers based in 1862 land grants found broad support for OA publishing, open-source licensing, and open data sharing, despite the increasing commercialization of university research outputs (Fernandez et al., 2016; Barham et al., 2017). One such survey, which focused on data-sharing attitudes and practices of agricultural researchers at two land grants, observes a direct relationship: those researchers who asserted that "data sharing supports the land-grant mission" shared their data (Fernandez et al., 2016). Although the study did not establish causality in the relationship between motivation and action, the authors argue, "This finding highlights the importance of the land-grant mission to understanding and influencing at least some agriculture researchers. … the land-grant mission represents a particular articulation of the obligations researchers have to the larger world" (Ibid.). A survey of scientific faculty members at 1862 and 1890 land-grants that anticipated that these institutions "should be strong supporters of science communication and encourage direct and meaningful engagement with their constituents and society" found strong support for and engagement with public science communication, "despite a perceived lack of institutional and collegial support" (Rose et al., 2020, p. 1276). Addressing agricultural researchers' recognition of the broader public benefit of OA articles, Williams et al. (2019) posit a connection:

> The wide availability of open access articles could be a particularly strong motivating factor for agricultural researchers at land-grant institutions, given their mission to communicate research results to citizens. Multiple Illinois interviewees expressed a commitment to this land-grant mission, such as one who said, "[the institution] was founded to give a neutral, independent, objective source of information that would benefit the public."

These findings indicate the potential for land-grant missions, and other appeals to advance knowledge, to compel individual researchers to openly share and publish their findings. They also lend insight into perceptions that, although individual researchers at land grants may feel motivated by the overarching land-grant mission, the universities themselves are not necessarily supportive of policies promoting or mandating public access.

## METHODS

The initial research question centered on a seemingly well-defined set of institutions: land-grant colleges and universities in the United States. Although there is some variation in the institutions that are considered land-grants, particularly as universities have lost or gained land-grant status over the years, the authors developed a study population of 112 institutions based on the Land-Grant University Website Directory from the USDA National Institute of Food and Agriculture (National Institute of Food and Agriculture, 2019): fifty-eight 1862 universities (including two HBCUs); nineteen 1890 HBCUs; and thirty-five 1994 TCUs across US states and territories.[6] A complete listing of land-grants is included as Appendix 1.

Having identified the study population, the next step was to ascertain the presence of formally approved, institution-level OA policies. Although colleges and units such as libraries within institutions have adopted OA policies governing publications produced within those units, the study's priority was to investigate the university-level and system-level policies for OA. University- and system-level policies incur a formal commitment with the potential for associated funding, resources, and processes.[7]

Drawing on Suber's definitive taxonomy of OA policies, this study uses the term "policy" to describe what is also commonly referred to in the literature as a mandate (2012, pp. 77-95). Essentially, institutional OA mandates require faculty, and sometimes other affiliated researchers, to make their research open and available while offering "opt-out" provisions for those seeking exceptions to OA deposit. In recognition of authors' academic freedom to choose their venues for publication, university OA mandates are, without exception, built around green OA. An adjacent category is the OA resolution, or what Suber calls "request or encouragement policies" (Ibid., p. 192, FN3). These are largely symbolic and opt-in

[6] Observing some duplication in the National Institute of Food and Agriculture directory, with the inclusion of specific colleges and extension units within the larger universities, the authors cross-referenced an Association of Public and Land-Grant University monograph, which supplied a list focused on the 50 states and indicated the primary institutions (as opposed to subunits) for 1862, 1890, and 1994 designated land grants (Association of Public and Land-Grant Universities, 2012). The study population of institutions was developed by reconciling these sources and focusing on the institutional level (rather than college level).

[7] The institution-level policy may be invoked through faculty governance (i.e., Faculty Senate) or through an administrative track (ratification by President or Chancellor). In some, but not all, cases, both avenues of approval occurred.

statements that indicate agreement with principles and practices of OA and encourage authors to make their research open.[8]

To start with authoritative sources that recognize adopted policies, lists of institutional policies hosted by MIT and the Scholarly Publishing and Academic Resources Coalition (SPARC) were consulted along with the Registry of Open Access Repository Mandates and Policies (ROARMAP) and the COAPI.[9] The authors checked each of these lists against the list of land grants and then verified policies based on institutional websites. The data set was updated as new policies such as the passage of IOAPs at Pennsylvania State University, Virginia Polytechnic Institute & State University (Virginia Tech), and the University of Maryland were announced.[10]

[8] The distinction between types of OA mandates and resolutions may be nuanced. As Suber argues, "successful policies are implemented through expectations, education, incentives, and assistance, not coercion" (2012, p. 87). This argument is further cemented through Suber's observation that all OA mandates currently in place include opt out provisions. Any mandate is dependent on institutional supports (i.e., adequate staffing, an institutional repository) and effective enforcement to achieve compliance. In the absence of these supports, a mandate may function as a mere resolution. Universities with OA policies accompanied by dedicated funding for gold OA fees, OA journal hosting, or strong green OA supports are likely to sustain more significant access to institutional scholarship (Suber, 2012, pp. 86-90).

[9] ROARMAP serves as an open registry of international OA policies, including both mandates and resolutions (Registry of Open Access Repository Mandates and Policies, 2019). Maintained by the University of Southampton, with EPrints as the underpinning technology, ROARMAP relies on submitters to register information about their policies. Their criteria for policies or mandates include: the source of the policy, whether faculty vote or administrative decision; whether deposit is required or recommended; who is the rightsholder and whether waivers or embargoes are supported; and if "gold" OA is supported through institutional funding (Ibid.). As of December 2021, ROARMAP had records for 81 institutional policies in the United States. SPARC hosts the COAPI, founded by the University of Kansas in 2011 as an organization "to exchange information and best practices around the development, implementation, and assessment of OA policies, and to advocate for practices that assist in the ongoing transformation of the scholarly communication system" (SPARC, n.d.). Full membership is limited to North American institutions reporting "institutional, divisional, or departmental" OA policies; those developing policies participate as affiliate members. As of July 2021, COAPI had 95 full members listed on its website; by July 2022, this number had risen to 98 (SPARC, n.d.). MIT Libraries also hosts a list of "OA Policies at Other Universities" in the United States and Canada, with a simple annotation indicating whether the policy was confined to a subunit or was an opt-in (or "encouragement") resolution. As of its last update (June 10, 2022), the list included 80 policies. Fewer than 80 institutions are represented on the list, which lists, for example, 9 separate academic faculties at Harvard (MIT Libraries, 2022).

[10] Additionally, in the summer of 2019, the websites of all land-grant institutions were systematically searched for any policy or record about OA adoption not included on any of the three lists/registries (MIT, SPARC, ROARMAP). The authors subsequently conducted discrete searches. Although these searches did not identify any policies or resolutions that were not included on existing registries, the search process did locate other institutional efforts to promote OA, such as hosting institutional repositories, offering funding for OA fees, or hosting open educational resources.

Using this list of land-grants with IOAPs, the study made use of publicly available data to impart context to the findings. Specifically, a number of government data sources were used for analysis and to provide benchmarks for comparison: demographics data from the Integrated Postsecondary Education Data System (IPEDS) published by the National Center for Education Statistics; federal investment data (grants and contracts) reported from USA Spending; and research and development (R&D) expenditures, as reported from the National Science Foundation (NSF). In addition, the Centre for Science and Technology Studies (CWTS) Leiden Ranking and proportion of OA, or PP(OA), measures were consulted to demonstrate how this sample of land grants compared with others in terms of percentage of publications that were OA.

There are limitations to these findings. They rely on publicly available information, with methods detailed earlier, to determine whether institutions have passed policies. Although this approach, which relies on cross-referencing four sources, identified current, active policies that had been publicly announced, the authors found it difficult to definitively assert that any institution did not have a policy. The study is limited to policies and resolutions that have passed at the institutional level and does not account for the following: 1) institutions that are currently in the process of proposing policies; or 2) unsuccessful attempts to pass policies. It does not consider potential institutional barriers to passing policies or analyze failures to do so.

This study does not attempt to comprehensively assess OA in the land grants. It focuses on institutional open or public access commitments through the adoption of policies that promote OA to scholarly output. Institutions may engage in activities that model or promote OA without adoption of an institution policy, including support for and development of open educational resources or open journals, university libraries' commitments to serving a broader public, or publisher agreements. This study does not explore these efforts, instead addressing the explicit and official commitment of a policy. However, IOAPs do not serve as binary indicators of institutional OA support, nor do they guarantee full access to institutional research output. As a report from the Coalition for Networked Information (2017, p. 5) observed, "There is a big difference between having a policy on the books and making a genuine institutional investment to seek to fulfill it." Just as land-grant status offers no assurance of an institution's continued commitment to offering practical, accessible education, OA policies have foundered in their ability to provision total public access. As Butler (2019) has explained, "open access policies are not a panacea. Perhaps most importantly, they are not self-executing."

Although a framework focused on institutional policies is integral to our research questions, which consider IOAPs as both functional levers and symbolic acts, this raises two closely related but important questions: 1) What percentage of institutional research output is openly published? and 2) How might IOAPs influence this percentage? These questions will be

addressed through an examination of the CWTS Leiden Ranking data, produced by the CWTS at Leiden University.

## RESULTS

As of December 2022, only 15 (with the UC system counted as one) of the 112 land-grant institutions in the United States have adopted IOAPs (Table 1). These 15 land-grants are all 1862 institutions with "Very high research activity" (R1) or "High research activity" (R2) status (Carnegie, n.d.). The authors identified four additional 1862 land-grants that have passed OA resolutions (Table 2).

| University | Date of IOAP |
|---|---|
| MIT | March 2009 |
| University of Hawaii at Manoa | Fall 2012 |
| University of Rhode Island | May 2013 |
| Oregon State University | June 2013 |
| UC system (10 schools) | July 2013; October 2015 |
| University of Minnesota | January 2015 |
| University of Delaware | April 2015 |
| Rutgers, The State University of New Jersey | September 2015 (passed October 2012) |
| University of Arizona | April 2016 |
| University of Illinois at Urbana-Champaign | May 2016 |
| University of Massachusetts at Amherst | July 2016 |
| Utah State University | August 2016 |
| Pennsylvania State University | January 2020 |
| Virginia Polytechnical and State University | July 2021 |
| University of Maryland | April 2022 |

IOAP, international open access policy; MIT, Massachusetts Institute of Technology; OA, open access; UC, University of California.

**Table 1.** US land-grant universities with Institutional Open Access policies

| University | Date of resolution |
|---|---|
| Cornell University | May 2005 |
| University of New Hampshire | March 2010 |
| University of Arkansas | June 2016 |
| Iowa State University | 2017 |

OA, open access.

**Table 2.** US land-grant universities with Institutional Open Access resolutions

Significantly, none of the 1890 HBCU land-grants, neither of the two 1862 HBCUs, nor any of the 1994 TCU land-grants appear to have adopted IOAPs or resolutions. There is also no indication in public HBCU and TCU institutional documents that either policies or resolutions is under consideration. None of the land-grants based in US territories or districts rather than states, i.e., American Samoa Community College; College of Micronesia; University of the District of Columbia; University of Puerto Rico; University of Guam; and University of the Virgin Islands, have passed OA policies or resolutions.

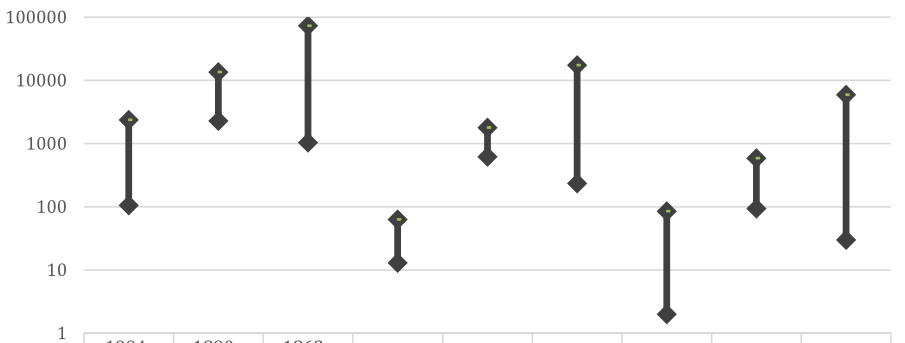
Furthermore, according to lists of institutional policies maintained by ROARMAP, MIT Libraries, and SPARC, none of the 100 HBCUs in the United States, regardless of land-grant status, have adopted an IOAP.

Although mandates or policies indicate a firm institutional commitment to OA, several institutions have adopted resolutions, demonstrating symbolic support for OA. Overall, 13% of land-grants have adopted IOAPs (15/112), and an additional 3.6% have adopted resolutions (4/112). Among the 1862 land-grants, 32.8% (19/58) have adopted either a policy or a resolution; 25.9% of 1862 land-grants have adopted a policy. These findings disprove the hypothesis of a direct correlation between land-grant status and OA policy adoption. Although the small sample size of land-grants with IOAPs precludes a detailed analysis of the attributes of these institutions, the next section will consider institutional characteristics as part of an effort to assess whether the "termite reforms" of IOAPs might disproportionately privilege access to research produced at well-funded and/or historically White land-grants. Further critical questions will be addressed in the Discussion section.

### Institutional characteristics

Findings showed that 87% of land-grant institutions, i.e., 74% of 1862 institutions and 100% of 1890 and 1994 institutions, do not have IOAPs. With the 10 UC system schools considered as separate land-grants with IOAPs, these numbers improve somewhat. However, IOAP adoption remains rare across land-grants. With so few land-grant institutions supporting IOAPs, it is difficult to generalize or draw conclusions about those that do. This section brings in data on institutional characteristics, including funding, resources, status, and racial demographics. These data inform an early analysis of the potential for selective adoption of IOAPs to perpetuate the cumulative advantage of researchers based at well-resourced or traditionally White universities.

Given the distinctive priorities and histories of 1862, 1890 (HBCUs), and 1994 (TCUs) land-grants, and the finding that IOAP adoption is limited to 1862 institutions, the researchers began by considering institutional demographics within these categories. The data used are fall 2020 data, providing a snapshot of enrollment prior to the COVID-19 pandemic




| | 1994 Undergrad | 1890 Undergrad | 1862 Undergrad | 1994 Grad* | 1890 Grad | 1862 Grad | 1994 Faculty | 1890 Faculty | 1862 Faculty |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 677 | 5455 | 29548 | 38 | 620,38 | 6487 | 24 | 229 | 1571 |
| Minimum | 106 | 2278 | 1037 | 13 | 0 | 234 | 2 | 94 | 30 |
| Maximum | 2369 | 13511 | 73267 | 63 | 1782 | 17485 | 85 | 586 | 5914 |

**Figure 1.** Faculty, graduate, and undergraduate population summary by type of land-grant institution (2019 IPEDS data)[11]. IPEDS, Integrated Postsecondary Education Data System.

(National Center for Education Statistics, IPEDS, 2021). These data provide a benchmark comparison by type of land-grant. The current land-grants are fairly distinctive in their focus and in the populations that they serve. Looking at the populations illustrated in Figure 1, the differences in size and capacity are clear, with the TCUs having the lowest number of full-time faculty and students. It is also noted that the TCUs are largely community college (2-year) programs, with an emphasis on vocational and technical skills that will result in employment. Per IPEDS, only two TCUs host any graduate programs; the emphasis on teaching at the undergraduate level would, in turn, explain the relatively low rate of published research from the TCUs. Conversely, the 1890 land-grants have a broad range in terms of undergraduate population, although still increased over the TCUs by a factor of almost 10. Regarding their graduate population, only one 1890 institution does not host a graduate program; the average graduate population is just less than one-tenth of the 1862 institutions. This relationship is similar in a comparison of the average faculty population between the 1890s and 1862s.

The overall enrollment of the institutions with IOAPs in this study ranged broadly, from 3030 students (graduate students only at UC San Francisco [UCSF]) to over 87,000 (total for undergraduate and graduate population at Penn State) in fall 2020. The specific populations of the institutions with IOAPs also varied significantly, as indicated in Table 3.

[11] Data Source: National Center for Education Statistics (2020). Note that only two 1994 (TCU) institutions have graduate enrollment, indicating that there is likely less of a focus on faculty research and publication.

| | Full-time faculty | Graduate enrollment (FTE) | Undergraduate enrollment (FTE) |
|---|---|---|---|
| **Mean** | 2143.6 | 7154.9 | 26,794 |
| **Minimum** | 687 | 1678 | 4511 |
| **Maximum** | 6463 | 19,975 | 75,756 |

FTE, full-time equivalent; IOAP, international open access policy.

**Table 3.** Summary population statistics of institutions with IOAPs (fall 2020)[12]

The focus on faculty was intentional because they are largely embedded in the research enterprise of the institution. The mean indicated that the institutions with IOAPs are primarily large schools, with full-time faculty over 10% of undergraduate enrollment and a graduate population that is approximately one-third that of the undergraduate. This detail is not surprising, as institutions with doctoral (PhD) programs, indicating research activity from graduate students and faculty, are fundamentally engaged with research publication as well as education.

Of the total 121 land-grant institutions (when including the 10 UC schools), a telling metric, shown in Table 4, may be US government funding by category, which includes the amount of grants and contracts that the institutions in these categories received in 2019.

| | 1862 land-grant | 1890 land-grant | 1994 land-grant |
|---|---|---|---|
| **Number of institutions in category with US funding (grants, contracts)** | 56 | 19 | 29 |
| **Minimum** | $652,863 | $5,727,319 | $1,622,300 |
| **Maximum** | $1,413,353,971 | $37,032,926 | $21,046,113 |
| **Mean** | $219,668,618 | $15,750,477 | $7,325,961 |
| **Total** | $14,278,460,185 | $299,259,059 | $212,452,854 |

**Table 4.** 2019 Federal investment by category (grants, contracts)[13]

However, as Table 5 demonstrates, a quick look at the reported R&D expenditures and government funding of grants and contracts for land-grants by category shows a disparity.

[12] Source: National Center for Education Statistics. The Integrated Postsecondary Education Data System. Available from the following link: https://nces.ed.gov/ipeds/use-the-data.

[13] Source: USA Spending Datalab (2019). Federal Investment in Higher Education. Office of the Chief Data Officer at the Bureau of the Fiscal Service, Department of the Treasury. 2019. https://datalab.usaspending.gov/colleges-and-universities/.

| | 1862 land-grant | 1890 land-grant | 1994 land-grant |
|---|---|---|---|
| **Number of institutions in category reporting expenditures** | 58 | 17 | 3 |
| **Minimum** | $1,523,000 | $3,796,000 | $347,000 |
| **Maximum** | $1,651,073,000 | $41,319,000 | $2,708,000 |
| **Mean** | $427,780,700 | $13,476,120 | $1,287,333 |
| **Total** | $24,383,501,000 | $229,094,000 | $3,862,000 |

R&D, research and development.

**Table 5.** 2020 R&D expenditures by institution category[14]

Land-grant institutions with OA policies are all "top tier" research-based universities, doctoral universities with high or very high research activity: 20 are classified as Carnegie R1s; 3 as Carnegie R2s; and 1, UCSF, a medical school, is Special Focus (Carnegie, n.d.). Moreover, those four land-grants with OA resolutions are all also Carnegie R1s. All 28 institutions, including both resolution- and mandate-supporting universities, will be considered in further analysis. Interestingly, the Carnegie Classification may be a useful benchmark for the 1862 and 1890 institutions, but it is not an option for the TCUs, the classification of which is described in IPEDS as "Tribal Colleges." As such, rather than simply using Carnegie Classification, this analysis will employ data that factor into the classification: research expenditures, government funding, and student enrollment and representation.

Considering the Carnegie status of the institutions included in this study as one common denominator, looking more closely at the institutional investment in research (based on NSF data) reveals that the average commitment for institutions with IOAPs approaches $600 million, with institutional investment spanning from more than $45 million to more than $1.6 billion. The data in Table 6 are based on a total (with data from over 600 institutions or all types) of $86,435,054,000 in R&D expenditures reported by NSF in 2020. For a benchmark comparison, Figures 2 and 3 demonstrate that the IOAP sample largely parallels the 1862 numbers, with the mean in both federal investment and R&D expenditures just slightly more for institutions with IOAPs. These data also illustrate the comparative lack of federal funding for 1890s and 1994s and the corollary decrease in R&D expenditures for institutions in those land-grant categories. The discrepancy is more apparent in consideration of the logarithmic scale of the graphs. Table 7 provides a more detailed look at the institutions with IOAPs.

[14] Source: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education R&D Survey. Rankings by total R&D expenditures [Internet]. National Science Foundation. Available from the following link: https://ncsesdata.nsf.gov/profiles/site?method=rankingBySource&ds=herd.

| | 2020 R&D expenditures | 2019 federal investment |
|---|---|---|
| **Minimum** | 45,966,000 | 22,187,867 |
| **Maximum** | 1,651,073,000 | 1,413,353,971 |
| **Mean** | 600,811,259 | 357,034,129 |

IOAP, international open access policy; R&D, research and development.

**Table 6.** Research expenditures and federal investment of land-grant institutions with IOAPs[15]


**Figure 2.** 2019 federal investment by type[16]

Based on the aforementioned data, the UC system, with funding merged from all 10 schools in the data set, has effectively the most in grants/contract funding, with over $7.2 billion ($7,230,733,000) in NSF R&D expenditures in 2020 and $4,522,635,984 in reported federal grants and contracts in 2019. Oddly, the UC system was not included in the land-grant funding (nor was MIT). The sources of land-grant funding included the following: Hatch Regular; Hatch Multi; McIntire Stennis; Animal Health; Smith Lever; Special Needs; Expanded Food and Nutrition Education Program (EFNEP); and the Renewable Resources Extension Act (RREA). Most of these funding programs require matching funds from the institutions.[19]

[15] R&D Expenditures data source: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education R&D Survey. Rankings by total R&D expenditures [Internet]. National Science Foundation. Available from the following link: https://ncsesdata.nsf.gov/profiles/site?method=rankingBySource&ds=herd.

[16] Federal Investment data source: USA Spending Datalab (2019). Federal Investment in Higher Education. Office of the Chief Data Officer at the Bureau of the Fiscal Service, Department of the Treasury. 2019. https://datalab.usaspending.gov/colleges-and-universities/.

[19] The only exceptions in the report were American Samoa Community College and Northern Marianas College.

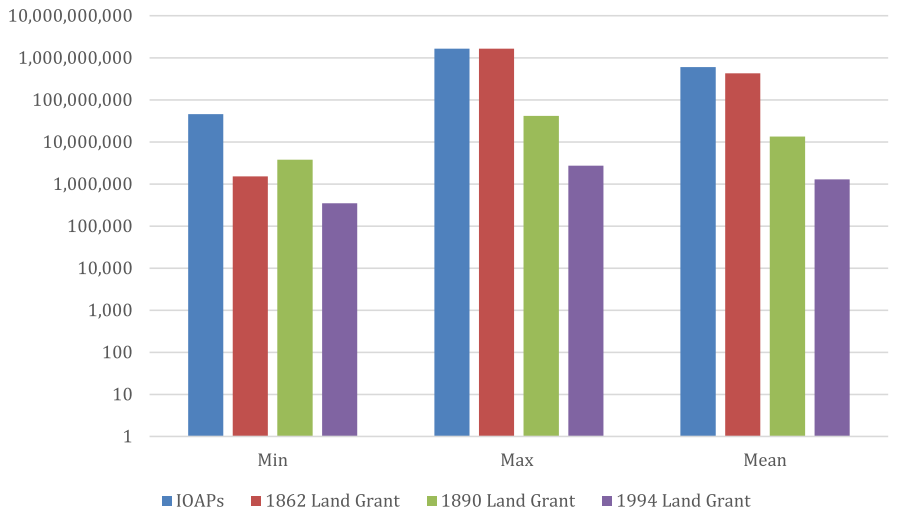



**Figure 3.** 2020 R&D expenditure by type[17]. IOAP, international open access policy; Max, maximum; Min, minimum; R&D, research and development.

Land-grant institutions with IOAPs are in the top quintile for the over 1000 institutions with R&D expenditures tracked by NSF through the Higher Education Research and Development Survey, which reports all research expenditures, not just NSF or US federal government. The federal investment data include both federal grants (of which NSF is one among several, including the Federal Emergency Management Agency (FEMA), the US Department of Commerce, etc.) and government contracts, based on other agreements with the US government, such as Research Data Centers or transportation research. However, it does not include land-grant funding.

It should be acknowledged that several federal granting agencies, particularly NSF and NIH, have implemented OA mandates that could influence OA institutional commitment. Of the over 1900 schools that reported some federal funding with a total of over $51 billion in grant and contracts, the IOAP-adopting institutions in this study are all in the top quintile. In fact, they are in the top 7.5%, and, thus, are considered some of the richest institutions in the United States in terms of federal funding. Their high degree of federal funding may be a motivating factor for adopting IOAPs.

## Further evidence of OA in land-grants

A framework focused on IOAPs as both functional levers and symbolic acts begs the significant question of whether and how institutions with IOAPs are fulfilling their policy commitment.

[17] R&D Expenditures data source: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education R&D Survey. Rankings by total R&D expenditures [Internet]. National Science Foundation. Available from: https://ncsesdata.nsf.gov/profiles/site?method=rankingBySource&ds=herd.

| University | 2020 NSF R&D ranking | 2020 R&D expenditures | 2019 federal investment (grants, contracts) | 2020 land-grant funding allocation |
|---|---|---|---|---|
| **UCSF** | 3 | 1,651,073,000 | 751,744,807 | |
| **UC San Diego** | 6 | 1,403,735,000 | 747,272,439 | |
| **UC Los Angeles** | 7 | 1,392,941,000 | 596,002,944 | |
| **Cornell University** | 12 | 1,190,063,000 | 473,076,635 | 20,139,656 |
| **University of Maryland** | 16* | 1,103,062,000* | 320,852,553 | 8,168,235 |
| **University of Minnesota, Twin Cities** | 20 | 1,042,382,000 | 496,580,097 | 18,231,120 |
| **Pennsylvania State University (University Park & Medical Center)** | 22 | 991,923,000 | 535,370,720 | 22,943,895 |
| **MIT** | 23 | 987,968,000 | 1,413,353,971 | |
| **UC Berkeley** | 30 | 840,000,000 | 1,380,601,092 | |
| **UC Davis** | 32 | 816,693,000 | 455,942,899 | |
| **University of Arizona** | 35 | 760,975,000 | 293,937,944 | 5,968,222 |
| **University of Illinois at Urbana-Champaign** | 39 | 689,176,000 | 300,172,149 | 19,964,157 |
| **Rutgers, State University of New Jersey** | 40 | 688,077,000 | 292,230,037 | 7,952,873 |
| **Virginia Polytechnic Institute & State University** | 49 | 556,341,000 | 182,191,507 | 16,091,097 |
| **University of California Irvine** | 55 | 490,597,000 | 273,694,983 | |

**Table 7.** Federal investment and R&D expenditures[18] **(Table continues on following page)**

[18] R&D Expenditures and NSF R&D Ranking data source: National Science Foundation, National Center for Science and Engineering Statistics, Higher Education R&D Survey. Rankings by total R&D expenditures [Internet]. National Science Foundation. 2020. Available from: https://ncsesdata.nsf.gov/profiles/site?method=rankingBySource&ds=herd Federal Investment data source: USA Spending Datalab. Federal Investment in Higher Education. Office of the Chief Data Officer at the Bureau of the Fiscal Service, Department of the Treasury. 2019. https://datalab.usaspending.gov/colleges-and-universities/. University of Maryland NSF R&D includes Baltimore and College Park.

| University | 2020 NSF R&D ranking | 2020 R&D expenditures | 2019 federal investment (grants, contracts) | 2020 land-grant funding allocation |
|---|---|---|---|---|
| **Iowa State University** | 71 | 363,107,000 | 178,600,408 | 19,841,032 |
| **Utah State University** | 83 | 304,256,000 | 151,324,625 | 5,089,739 |
| **University of Hawaii at Manoa** | 91 | 275,929,000 | 219,118,595 | 3,902,882 |
| **Oregon State University** | 95 | 268,385,000 | 202,450,005 | 10,128,267 |
| **UC Santa Barbara** | 101 | 254,434,000 | 121,578,251 | |
| **University of Massachusetts Amherst** | 113 | 219,389,000 | 107,153,816 | 7,286,180 |
| **University of Delaware** | 111 | 220,445,000 | 130,177,915 | 3,662,588 |
| **University of Arkansas Fayetteville** | 133 | 165,887,000 | 53,995,122 | 13,265,119 |
| **UC Riverside** | 128 | 184,894,000 | 91,877,323 | |
| **University of New Hampshire** | 137 | 156,901,000 | 66,811,610 | 4,739,825 |
| **UC Santa Cruz** | 142 | 150,400,000 | 81,474,607 | |
| **University of Rhode Island** | 158 | 109,967,000 | 57,180,687 | 3,437,089 |
| **UC Merced** | 207 | 45,966,000 | 22,187,867 | |

MIT, Massachusetts Institute of Technology; NSF, National Science Foundation; R&D, research and development; UC, University of California; UCSF, UC San Francisco.

**Table 7 (continued)**

What percentage of institutional research output is openly published from these institutions, and how do they compare with other land grants without IOAPs? In short, does a land-grant with an IOAP actually publish a higher proportion of its research OA? To begin to address this question, the authors relied on the international CWTS Leiden Ranking. The Leiden Ranking enriches Web of Science (WoS) data, including by assigning publications to universities and adding OA labels, to provide bibliometric indicators of university performance.

In a ranking of the top 200 US universities by their proportion of OA publications in WoS (2016-2019), 60 positions are occupied by land-grants. All land-grants represented on

| | 2021 PP (OA) | 2021 Leiden Ranking: US | 2021 Leiden Ranking: land-grants | Year of IOAP adoption |
|---|---|---|---|---|
| **MIT** | 77.0 | 4 | 1 | 2009 |
| **UC Santa Cruz** | 75.8 | 5 | 2 | 2013/2015 |
| **UCSF** | 75.5 | 7 | 3 | 2013/2015 |
| **UC San Diego** | 73.8 | 8 | 4 | 2013/2015 |
| **UC Berkeley** | 72.8 | 11 | 5 | 2013/2015 |
| **UC Irvine** | 69.2 | 26 | 7 | 2013/2015 |
| **UC Los Angeles** | 68.2 | 36 | 8 | 2013/2015 |
| **UC Santa Barbara** | 67.2 | 42 | 9 | 2013/2015 |
| **University of Arizona** | 67.2 | 43 | 9 | 2016 |
| **UC Davis** | 66.7 | 45 | 11 | 2013/2015 |
| **UC Riverside** | 66.4 | 46 | 12 | 2013/2015 |
| **Cornell University** | 66.2 | 50 | 13 | 2005 (resolution) |
| **University of Hawaii at Manoa** | 64.6 | 58 | 16 | 2012 |
| **University of Maryland, College Park** | 64.0 | 64 | 17 | 2022 |
| **UC Merced** | 63.5 | 68 | 18 | 2013/2015 |
| **University of Minnesota, Twin Cities** | 63.3 | 71 | 19 | 2015 |
| **Iowa State University** | 62.6 | 75 | 21 | 2017 (resolution) |
| **University of Rhode Island** | 61.1 | 82 | 22 | 2013 |
| **Rutgers, State University of New Jersey** | 58.4 | 96 | 25 | 2015 |
| **University of Massachusetts Amherst** | 57.9 | 100 | 26 | 2016 |
| **University of New Hampshire** | 57.9 | 101 | 26 | 2010 (resolution) |
| **University of Illinois at Urbana-Champaign** | 57.2 | 108 | 29 | 2016 |
| **Pennsylvania State University** | 55.2 | 119 | 34 | 2020 |
| **University of Delaware** | 55.0 | 121 | 36 | 2015 |
| **Oregon State University** | 55.0 | 122 | 36 | 2013 |
| **Utah State University** | 53.2 | 138 | 45 | 2016 |

**Table 8.** Leiden Ranking and PP(OA) for land grants with IOAPs (2016–2019 data)[20] **(Table continues on following page)**

[20] Data source: Van Eck (2021). CWTS Leiden Ranking 2021 (2016–2019). https://www.leidenranking.com/ranking/2021/list. Zenodo. May 10, 2021. https://doi.org/10.5281/zenodo.4745545.

| | 2021 PP (OA) | 2021 Leiden Ranking: US | 2021 Leiden Ranking: land-grants | Year of IOAP adoption |
|---|---|---|---|---|
| **Virginia Polytechnic Institute & State University** | 52.1 | 143 | 48 | 2021 |
| **University of Arkansas Fayetteville** | 45.6 | 179 | 57 | 2016 (resolution) |

IOAP, international open access policy; MIT, Massachusetts Institute of Technology; OA, open access; PP(OA), proportion of OA; UC, University of California.

**Table 8 (continued)**

the list are 1862 land-grant institutions. The 1890 and 1994 land-grants do not meet the threshold of publication output required for inclusion in Leiden and are not represented in the data at all. The sample in this study, with IOAPs, make up almost half of those land-grant institutions included in the Leiden data but are highly ranked in comparison. Of the land-grants ranked in the top 50 for proportion of OA, 12 out of 13 have adopted OA policies or resolutions (Montana State University is the only land-grant in this top quartile without an IOAP). As Table 8 shows, although the majority of the IOAP land-grants have over 50% for the proportion of OA publications, they are not necessarily highly ranked in comparison with the other US institutions, many of which are private. As the institutional commitment for the universities within the UC system is on relatively equal footing, subject to the same mandates and legislative directives and partaking of similar resources, services, and funding opportunities, it is probably not surprising to see their activity, as reported by Leiden, with each individual school in the top quintile of institutions worldwide in terms of percentage of OA publications of total.

Without establishing causality, the Leiden data suggest that land-grants with IOAPs publish a higher proportion of their research output OA compared with their land-grant peers without IOAPs. The institutions in the IOAP sample are also in the top quintile for both R&D expenditures and for federal funding, implying a correlation between OA activity (per Leiden) and funding, potentially attributable to OA mandates by federal funders. Limitations of this observation are the scope of the WoS data set.

## DISCUSSION

A dominant, influential, and popular historiography described by Sorber and Geiger (2014) as the "romantic school" celebrates land-grants as egalitarian, democratizing agents bringing accessible, practical education to the masses and serving the needs of farmers. The romantic school is disputed by revisionist historians who have critiqued and problematized these claims and located alternative influences and forces at play in the development of modern

land-grants. Most recently, a groundbreaking, data-driven project published in 2020 brought significant public and institutional attention to the violent seizure of Indigenous lands that laid the foundation for the "Land-Grab Universities" (Lee & Ahtone, 2020). As Nash (2019, p. 440) argues, rather than fulfilling the popular ideal of their role as "democracy's colleges," land-grant universities represent "a central element of settler colonialism." Nash elaborates, "The college boosters emphasized agricultural and scientific education that would help foster capitalism, industrialization, and nation-state building." To the extent that the Morrill Act democratized access to education, "it did so at the expense of Native Americans and to the benefit of land speculators and agribusiness" (Ibid., p. 440).

Legacies of segregation and Indigenous dispossession are glossed over in indistinct appeals to land-grants as drivers of public benefit. Seals (1991, p. 12) argues,

> Those of us who toil in the state and federal agricultural arena, whether we know it or not, work with the consequences, good or bad, of the legislation which set up the agricultural development apparatus in this country. Particularly those of us who are African-Americans or who work at the 1890 colleges are recipients of a significantly different heritage relative to the land-grant acts.

Initiated with lesser funding, the 1890 institutions were hampered by federal limitations on accessing federal funding for agricultural research that preferenced 1862 institutions. These funding policies were reversed in the 1970s. But historical inequities between 1862 and 1890 land-grants persist into the present day, exacerbated by distinctive trajectories for particular institutions at the state or territory level. The allocation of public funding for public universities is based on factors that are neither straightforward nor transparent; it needs more public scrutiny.

This study finds that only research-intensive 1862 land-grants that are located in the top 7.5% of federal funding have adopted IOAPs. It further establishes, without establishing causality, that land-grants with IOAPs appear to publish a higher proportion of their research output OA compared with their land-grant peers. These findings align with critiques of both land-grants and OA: land-grant institutions are overwhelmingly not mandating public dissemination of their research (beyond compliance with funder mandates), and OA policies are only adopted by the most privileged land-grant institutions, contributing to the cumulative advantage of their affiliated researchers.

Further research is needed that addresses the complexities of race, status, resource allocation, and publication output across both land-grant institutions and the broader landscape of higher education in the United States. This study establishes that HBCUs and TCUs have not adopted IOAPs but does not extensively explore either the causes or implications of

this finding. Are the IOAP land-grants identified in this study all historically or predominantly White? This is, perhaps unsurprisingly, a complex question. Examining the demographics (with fall 2019 data to mitigate other issues from the pandemic), specifically race and ethnicity, of undergraduate students enrolled in the different types of land-grants reveals stark differences linked to the land-grant acts: 1862 land grants are majority (over 50%) White on average; 1890 land grants are almost 70% Black/African on average; and 1994 land grants are over 80% American Indian/Alaskan Native.[21] However, averages obscure institutional distinctions. Included among the 1862 land-grants are two HBCUs: the University of the District of Columbia and the University of the Virgin Islands. Among the land-grants with IOAPs are several designated by the US Department of Education as minority-serving institutions, meeting eligibility requirements centered around undergraduate enrollment, including Asian American and Native American Pacific Islander-serving institutions; Hispanic-serving institutions (HSIs); and Alaskan Native or Native Hawaiian-serving institutions. Because these designations center on undergraduate enrollment, they fail to capture faculty and researcher demographics, which are especially important when considering the cumulative advantages of IOAPs. Vargas et al. (2020, p. 39), examining Latinx faculty representation in HSIs, rebuke assumptions with their findings: "Analyses of all Title V funded HSIs from 2009-2016 (N = 167) indicate that the average Latinx student-to-Latinx faculty ratio is 146:1, whereas the corollary White student-to-White faculty ratio is 10:1." Furthermore, demographic assessment may fail to elucidate and account for deeper racialization of higher education and, in particular, the normativity of whiteness as "the dominant racial identity" (Bonilla-Silva & Peoples, 2022, p. 1491). As Bonilla-Silva and Peoples argue in their article on historically White colleges and universities: "our claim is not purely based on demography. Although numbers matter, the way that racial power and history has shaped these institutions matters more" (Ibid., p. 1493).

## CONCLUSION

In spite of the anticipated alignment between the land-grant mission, with its emphasis on applied research, accessible education, and service to the public good, and the OA movement's

[21] Data about undergraduate students' race and ethnicity is collected based on the US Office of Management and Budget's two-part classification system, which relies on self-identification to classify ethnicity as either "Hispanic or Latino" or "Not Hispanic or Latino" and offers five categories for race: American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; and White (National Center for Education Statistics, 2021). Reliance on these data is a limitation in the context of a growing recognition that "the collection and use of racial and ethnic data have largely remained one dimensional, often treating race and ethnicity as monolithic and static for individuals across contexts and over the life course, even while major demographic trends in the past 50 years have increased the need for more sophistication in our operationalization of racial measurement" (Campbell et al., 2016).

promise of equitable access to knowledge, this study finds that a minority of land-grant institutions have formally committed to OA through the adoption of policies. Notably, as of December 2022, only 15 land-grant universities, all of which were established as land-grants under the terms of the 1862 act, have passed IOAPs. An additional four 1862 land-grants have adopted non-binding OA resolutions encouraging affiliated researchers to pursue and promote OA publishing. Fewer than a third of the 1862 land-grants have passed either a resolution or policy signaling a commitment to institutional OA. No 1890 or 1994 land-grant university, nor any HBCU or TCU in the United States, has adopted an IOAP or a resolution yet.

As land-grant historian Sorber has observed, "We don't have a land-grant system; we have a lot of land-grant systems. You have to look at local and regional social and economic conditions first, and then and only then can you get a sense of what the land-grant mission is for each state" (quoted in Gavazzi & Gee, 2018, pp. 41-42). The complexity and dynamism that has been built into the land-grant universities, federally endowed but state-controlled, ranging from huge R1 state flagships to elite private universities to 2-year TCUs, contributes to challenges to collective action on behalf of land-grant universities. However, the public perception of land-grants as public-serving allows for shared advocacy toward achieving a shared mission. The authors observe an opportunity for land-grant universities to advocate for public access to their research output, perhaps through an approach aligned with public mission that supersedes problematic IOAPs. In advancing public access, land-grants may collectively draw on public perception of their commitment to the common good; their faculty's embrace of the land-grant public mission; and the diverse institutional makeup of land-grants themselves. New community assessment standards could promote and advance the heterogeneous and collective missions of land-grant institutions.

Alternatively, a federal OA mandate targeted at public universities or land-grants could unilaterally achieve the objective of public access to publications produced at these institutions. A recent report from the National Academies of Sciences, Engineering, and Medicine, compiled in response to a 2021 congressional directive, "examines the potential for land-grant colleges and universities to increase the impact of their collective contributions to the American public through inter-institutional coordination and collaboration," to meet national priorities such as global food security (2022, p. 1). The report, which is specifically attentive to the need to cultivate collaboration between and among the 1862, 1890, and 1994 land-grants, identifies requirements for achieving coordination, including "uniform, shared data management systems that enable seamless access to emerging information" and "outstanding communications support to inform the public" (Ibid., p. 4). OA, although not mentioned by name in the report, is a precondition for achieving these requirements.

Would a land-grant-wide OA mandate, amply supported by relevant resources, contribute to greater equity among and between these diverse institutions? Further data are needed to

discern whether such a mandate, accompanied by dedicated resources, would advance the goal of public access to publicly funded research and redistribute some of the cumulative advantages accrued by researchers at well-funded, traditionally White institutions or perpetuate the myth of reform, and of equity, in institutions designed to systematize inequities. Certainly, complementary research into the state of OA in HBCUs and TCUs and the effect of OA policies on land-grant-dominant scholarship (for example, on the agricultural and veterinary literature) is needed to better understand the landscape and implications of public access to land-grant scholarship. Research into these questions will help interrogate assumptions embedded in institutional approaches to OA and deeper issues of race, equity, representation, and access to research produced in US universities.

## ACKNOWLEDGMENTS

Some data in this study were analyzed as part of the NSF-sponsored Research Experience for Undergraduates site: Research Institute in Sociology and Social Inequality, held at Texas A&M University in Summer 2021 and directed by Dr. Mary Campbell and Dr. Alexander A. Hernandez. Special thanks to Dr. Campbell, Garrett Riley, and Vansa Shewakramani Hanson for their work to develop the institutional demographics data set. The authors wish to thank Dr. Bruce Herbert and Dr. Billy McKim for their invaluable feedback and Martijn Visser (CWTS) for responding to questions about the Leiden data set. Thanks, too, to attendees at presentations to the Society for the Study of Curriculum History and the Texas Conference on Digital Libraries and to *Journal of Librarianship & Scholarly Communication* reviewers and editors, who provided generous, insightful feedback.

## REFERENCES

Adema, J., & Moore, S. A. (2018). Collectivity and collaboration: imagining new forms of communality to create resilience in scholar-led publishing. *Insights*, *31*(0), 3.

Albornoz, D., Okune, A., & Chan, L. (2020). Can open scholarly practices redress epistemic injustice? In Eve, M. P., Gray, J. (Eds.), *Reassembling scholarly communications: Histories, infrastructures, and global politics of open access*. MIT Press.

Allen, W. R., & Jewell, J. O. (2002). A backward glance forward: past, present and future perspectives on historically black colleges and universities. *The Review of Higher Education*, *25*(3), 241–261. https://doi.org/10.1353/rhe.2002.0007

American Indian Higher Education Consortium, & The Institute for Higher Education Policy. (1999). *Tribal Colleges: An Introduction*. https://digitalcommons.unomaha.edu/slcetribalnations/4

APLU. (n.d.). Land-grant university FAQ. *About APLU*. Association of Public & Land-Grant Universities. https://www.aplu.org/about-us/history-of-aplu/what-is-a-land-grant-university/

Association of Public and Land-Grant Universities. (2012). The Land-Grant Tradition. http://www.aplu.org/library/the-land-grant-tradition/file

Barham, B., Goldman, I., van Rijn, J., Foltz, J., & Agnes, M. I. (2017). Land-grant university faculty attitudes in and engagement with open source scholarship and commercialization. *Agricultural & Environmental Letters*, *2*(1), 170008. https://doi.org/10.2134/ael2017.03.0008

The Carnegie Classification of Institutions of Higher Education. (n.d.). Basic classification description. https://carnegieclassifications.iu.edu/classification_descriptions/basic.php

Bonilla-Silva, E., & Peoples, C. E. (2022). Historically white colleges and universities: the unbearable whiteness of (most) colleges and universities in America. *American Behavioral Scientist*, *66*(11), 1490–1504. https://doi.org/10.1177/00027642211066047

Boyer, P. (2015) *Capturing education: Envisioning and building the first tribal colleges*. Salish Kootenai College Press.

Boyer, P. (2010). Introduction: A new vision for math and science. In Boyer, P. (Ed.), *Ancient wisdom, modern science: The integration of native knowledge in math and science at tribally controlled colleges and universities*. Salish Kootenai College Press.

Butler, B. (2019). Open access policies, big deals, and equity. *UVA Library News and Announcements.* https://news.library.virginia.edu/2019/10/25/open-access-policies-big-deals-and-equity/

Campbell, M. E., Bratter, J. L., & Roth, W. D. (2016). Measuring the diverging components of race: an introduction. *American Behavioral Scientist*, *60*(4), 381–389. https://doi.org/10.1177/0002764215613381

Cantrell, M., & Johnson, A. (2018). Engaged citizenship through campus-level democratic processes: a librarian and graduate student collaboration on open access policy adoption. *Journal of Librarianship and Scholarly Communication*, *6*(2). https://doi.org/10.7710/2162-3309.2229

Christen, K. (2012). Does information really want to be free? Indigenous knowledge systems and the question of openness. *International Journal of Communication*, *6*, 2870–2893. https://ijoc.org/index.php/ijoc/article/view/1618

Coalition for Networked Information. (2017 May). *Rethinking institutional repository strategies* [report of a CNI executive roundtable held April 2 & 3, 2017]. https://www.cni.org/wp-content/uploads/2017/05/CNI-rethinking-irs-exec-rndtbl.report.S17.v1.pdf

Crazy Bull, C., Lindquist, C., Burns, R., Vermillion, L., & McDonald, L. (2020). Tribal colleges and universities: building nations, revitalizing identity. *Change: The Magazine of Higher Learning*, *52*(1), 23–29. https://doi.org/10.1080/00091383.2020.1693819

Croft, G. K. (2019). *The U.S. land-grant university system: An overview* [Report No. https://doi.org/R45897]. https://crsreports.congress.gov/product/pdf/R/R45897

Emmett, A., Stratton, J., Peterson, A. T., Church-Duran, J., & Haricombe, L. J. (2011). Toward open access: it takes a "village." *Journal of Library Administration*, *51*(5–6), 557–579. https://doi.org/10.1080/01930826.2011.589345

Evans, M. A. J. (2012). Open access to scientific literature: An assessment of awareness support and usage among academic librarians at historically black colleges and universities [Doctoral dissertation, Southern University and Agricultural and Mechanical College].

Feir, D., & Jones, M. E. C. (2021). Repaying a debt? The performance of Morrill Act university beneficiaries as measured by native enrollment and graduation rates. *Native American and Indigenous Studies*, *8*(1), 129–138. http://muse.jhu.edu/article/784825

Fernandez, P., Eaker, C., Swauger, S., & Steiner Davis, M. L. E. (2016). Public progress, data management and the land grant mission: a survey of agriculture researchers' practices and attitudes at two land-grant institutions. *Issues in Science & Technology Librarianship*, *83*. https://doi.org/10.5062/F49P2ZNN

Finnie Duranceau, E., & Kriegsman, S. (2013). Implementing open access policies using institutional repositories. In Bluh, P., Hepfer, C. (Eds.), *The Institutional repository: Benefits and challenges*. American Library Association, Association for Library Collections and Technical Services. http://www.ala.org/alcts/sites/ala.org.alcts/files/content/resources/papers/ir_ch05_.pdf

Finnie Duranceau, E., & Kriegsman, S. A. (2016). Campus open-access policy implementation models and implications for IR services. In Callicott, B. B., Scherer, D., Wesolek, A. (Eds.), *Making institutional repositories work*. Purdue University Press. https://dash.harvard.edu/handle/1/23503499

Fruin, C., & Sutton, S. (2016). Strategies for success: open access policies at North American educational institutions. *College & Research Libraries*, *77*(4), 469–499. https://doi.org/10.5860/crl.77.4.469

Gavazzi S. M., Gee E. G. (2018). *Land-grant universities for the future: Higher education for the public good*. Johns Hopkins University Press.

Humphries, F. S. (1991). 1890 land-grant institutions: their struggle for survival and equality. *Agricultural History*, *65*(2), 3–11.

Kansa, E. (2014 January 27). It's the neoliberalism, stupid: why instrumentalist arguments for open access, open data, and open science are not enough. *Impact of Social Sciences.* https://blogs.lse.ac.uk/impactofsocialsciences/2014/01/27/its-the-neoliberalism-stupid-kansa/

Kelley, J. K. (2007). Owning the sun: can native culture be protected through current intellectual property law. *J. High Tech. L.*, *7*, 180.

Kiesewetter, R. (2020). Undoing scholarship: towards an activist genealogy of the OA movement. *Tijdschrift voor Genderstudies*, *23*(2), 113–130. https://doi:10.5117/TVGN2020.2.001.KIES

Kipphut-Smith, S., Boock, M., Chapman, K., & Willi Hooper, M. (2018). Measuring open access policy compliance: results of a survey. *Journal of Librarianship and Scholarly Communication*, *6*(1). https://doi.org/10.7710/2162-3309.2247

Lee, R., & Ahtone, T. (2020 March 30). *Land-grab universities*. High Country News. https://www.hcn.org/issues/52.4/indigenous-affairs-education-land-grab-universities

Meagher, K. (2021). Introduction: the politics of open access—decolonizing research or corporate capture? *Development and Change*, *52*(2), 340–358. https://doi:10.1111/dech.12630

MIT Libraries. (2022). Scholarly communications - MIT Libraries: OA policies at other universities. https://libraries.mit.edu/scholarly/mit-open-access/oa-policies-at-other-universities/

Mitchell, C. (2016). *Does the UC open access policy miss the mark? Depends on which mark*. Office of Scholarly Communication. https://osc.universityofcalifornia.edu/2016/10/does-the-uc-open-access-policy-miss-the-mark-depends-on-which-mark/

Mittell, J. (2013 March 4). *The real digital change agent*. The Chronicle of Higher Education. https://www.chronicle.com/article/the-real-digital-change-agent/

Morales, M. E., & Williams, S. (2021). Moving towards transformative librarianship: Naming and identifying epistemic supremacy. In Leung, S. Y., López-McKnight, J. R. (Eds.), *Knowledge justice: Disrupting library and information studies through critical race theory.* MIT Press.

Mullen, L. B., Otto, J. (2014). Open access policymaking: roles for academic librarians as "change agents" in research institutions. *Qualitative and Quantitative Methods in Libraries (QQML) Journal*, *1*, 295–307. https://doi.org/10.7282/T3SJ1HZW

Nash, M. A. (2019). Entangled pasts: land-grant colleges and American Indian dispossession. *History of Education Quarterly, 59*(4), 437–467. https://doi.org/10.1017/heq.2019.31

National Academies of Sciences, Engineering, and Medicine. (2022). Enhancing coordination and collaboration across the land-grant system. *The National Academies Press*. https://doi.org/10.17226/26640

National Center for Education Statistics. (n.d.). The Integrated Postsecondary Education Data System. https://nces.ed.gov/ipeds/use-the-data

National Center for Education Statistics. (2021). Definitions for new race and ethnicity categories. *The Integrated Postsecondary Education Data System.* https://nces.ed.gov/ipeds/report-your-data/race-ethnicity-definitions

National Institute of Food and Agriculture. (2019). *Land-grant university website directory.* 2019. https://nifa.usda.gov/land-grant-colleges-and-universities-partner-website-directory

National Research Council. (1995). Colleges of agriculture at the land grant universities: A profile. *The National Academies Press*. https://doi.org/10.17226/4980

National Science Foundation. (2021). *Rankings by total R&D expenditures*. National Center for Science and Engineering Statistics, Higher Education R&D Survey. https://ncsesdata.nsf.gov/profiles/site?method=rankingBySource&ds=herd

Olejniczak, A. J., & Wilson, M. J. (2020). Who's writing open access (OA) articles? Characteristics of OA authors at Ph.D.-granting institutions in the United States. *Quantitative Science Studies*, *1*(4), 1429–1450. https://doi.org/10.1162/qss_a_00091

Otto, J. (2016). A resonant message: aligning scholar values and open access objectives in OA policy outreach to faculty and graduate students. *Journal of Librarianship and Scholarly Communication*, *4*(0), eP2152. https://doi.org/10.7710/2162-3309.2152

Phillips, J. L. (2003). A tribal college land grant perspective: changing the conversation. *Journal of American Indian Education*, *42*(1), 22–35.

Reed, T. (2020). Creative sovereignties: should copyright apply on tribal lands? *J. Copyright Soc'y USA*, *67*, 313. https://doi.org/10.2139/ssrn.3736137

Registry of Open Access Repository Mandates and Policies. (2019). Welcome to ROARMAP. http://roarmap.eprints.org/

Riley, E. T., Vadiee, N., & Ganguli, A. C. (2017). The Evolution of Research at Tribal Colleges and Universities. *Tribal College*, *29*(2), 38–37. https://tribalcollegejournal.org/the-evolution-of-research-at-tribal-colleges-and-universities/

Rose, K. M., Markowitz, E. M., & Brossard, D. (2020). Scientists' incentives and attitudes toward public communication. *Proc Natl Acad Sci U S A*, *117*(3), 1274–1276. https://doi.org/10.1073/pnas.1916740117

Rosenblum, B. (2010 July 6). *Academic libraries and open access: policies, services and resources for increasing access to scholarship*. The University of Kansas. https://kuscholarworks.ku.edu/handle/1808/6392

Ross-Hellauer, T., Reichmann, S., Cole, N. L., Fessl, A., Klebel, T., & Pontika, N. (2022). Dynamics of cumulative advantage and threats to equity in open science: a scoping review. *Royal Society Open Science*, *9*(1), 211032. https://doi.org/10.1098/rsos.211032

Seals, R. G. (1991). The formation of agricultural and rural development policy with emphasis on African-Americans: II. the Hatch-George and Smith-Lever Acts. *Agricultural History*, *65*(2), 12–34.

Shorish, Y., Chan, L. (2019). Co-creating open infrastructure to epistemic diversity and knowledge equity. *ScholarLed blog*. https://blog.scholarled.org/co-creating-open-infrastructure-to-support-epistemic-diversity-and-knowledge-equity/?ref=investinopen.org

Shreve, B. (2019, February 17). Joe McDonald on the passage of the 1994 Land Grant Act. *Tribal College Journal of American Indian Higher Education*. https://tribalcollegejournal.org/joe-mcdonald-on-the-passage-of-the-1994-land-grant-act/

Smith, K. L. (2012). Why open access? The policy environment and process on one university campus. *Insights*, *25*(3), 246–250.

Soper, D. (2017). On passing an open access policy at Florida State University: from outreach to implementation. *College & Research Libraries News*, *78*(8). https://doi.org/10.5860/crln.78.8.432

Sorber, N., quoted in Gavazzi, S. M., & Gee, E. G. (2018). *Land-grant universities for the future: Higher education for the public good*. Johns Hopkins University Press.

Sorber, N. M., & Geiger, R. L. (2014). The welding of opposite views: land-grant historiography at 150 years. In Paulsen, M. B. (Ed.), *Higher education: Handbook of theory and research* (vol. *29*, pp. 385–422). Springer Netherlands. https://doi.org/10.1007/978-94-017-8005-6_9

SPARC. (n.d.). About COAPI. https://sparcopen.org/coapi/about/

SPARC. (n.d.). COAPI members. https://coapi.sparcopen.org/members

Suber P. (2012). Open access [the MIT Press Essential Knowledge Series]. MIT Press.

Tennant, J. P., Waldner, F., Jacques, D. C., Masuzzo, P., Collister, L. B., & Hartgerink C. H. J. (2016). The academic, economic and societal impacts of open access: an evidence-based review. *F1000Res*, *5*. https://doi:10.12688/f1000research.8460.3

The Editors. Revisiting open access publishing – Part II. *Geoforum*, *118*, 201–202. https://doi.org/10.1016/j.geoforum.2020.09.009

USA Spending Datalab. (2019). *Federal investment in higher education*. Office of the Chief Data Officer at the Bureau of the Fiscal Service, Department of the Treasury. https://datalab.usaspending.gov/colleges-and-universities/

Van Eck, N. J. (2021). *CWTS Leiden Ranking 2020* [Data set]. *Zenodo*. https://doi.org/10.5281/zenodo.4745545

Vargas, N., Villa-Palomino, J., & Davis, E. (2000). Latinx faculty representation and resource allocation at Hispanic serving institutions. *Race Ethnicity and Education*, *23*(1), 39–54. https://doi.org/10.1080/13613324.2019.1679749

Williams, S. C., Farrell, S. L., Kerby, E. E., & Kocher, M. (2019). Agricultural researchers' attitudes toward open access and data sharing. *Issues in Science and Technology Librarianship*, (91). https://doi.org/10.29173/istl4

Xia, J., Gilchrist, S. B., Smith, N. X. P, Kingery, J. A., Radecki, J. R., & Wilhelm, M. L., Harrison, K. C., Ashby, M. L., & Mahn, A. J. (2012). A review of open access self-archiving mandate policies. *portal: Libraries and the Academy*, *12*(1), 85–102. https://doi:10.1353/pla.2012.0000

Zhang, H., Boock, M., & Wirth, A. (2015). It takes more than a mandate: factors that contribute to increased rates of article deposit to an institutional repository. *Journal of Librarianship and Scholarly Communication*, *3*(1), eP1208. https://doi:10.7710/2162-3309.1208

## APPENDIX 1:
## List of U.S. Land Grants

| 1862 Designation (58 total) | |
|---|---|
| American Samoa Community College | University of Florida[v] |
| Auburn University[v] | University of Georgia[v] |
| Clemson University | University of Guam |
| Colorado State University[v] | University of Hawaii |
| (Community) College of Micronesia | University of Idaho |
| Cornell University[v] | University of Illinois[v] |
| Iowa State University[v] | University of Kentucky |
| Kansas State University[v] | University of Maine |
| Louisiana State University[v] | University of Maryland, College Park |
| Massachusetts Institute of Technology | University of Massachusetts |
| Michigan State University[v] | University of Minnesota[v] |
| Mississippi State University[v] | University of Missouri[v] |
| Montana State University | University of Nebraska |
| New Mexico State University | University of Nevada, Reno |
| North Carolina State University[v] | University of New Hampshire |
| North Dakota State University | University of Puerto Rico |
| Northern Marianas College | University of Rhode Island |
| Ohio State University[v] | University of Tennessee[v] |
| Oklahoma State University[v] | University of the District of Columbia* |
| Oregon State University[v] | University of the Virgin Islands* |
| Pennsylvania State University | University of Vermont |
| Purdue University[v] | University of Wisconsin - Madison[v] |
| Rutgers, State University of New Jersey | University of Wyoming |
| South Dakota State University | Utah State University |
| Texas A&M University[v] | Virginia Polytechnic Institute & State University[v] |
| University of Alaska Fairbanks | Washington State University[v] |
| University of Arizona | West Virginia University |
| University of Arkansas | |
| University of California System[v] | |
| University of Connecticut | |
| University of Delaware | |

| 1890 Designation (19 total) | |
|---|---|
| Alabama A&M University* | North Carolina A&T State University* |
| Alcorn State University* | Prairie View A&M University* |
| Central State University* | South Carolina State University* |
| Delaware State University* | Southern University and A&M College* |
| Florida Agricultural and Mechanical University* | Tennessee State University* |
| Fort Valley State University* | Tuskegee University[V]* |
| Kentucky State University* | University of Arkansas at Pine Bluff* |
| Langston University* | University of Maryland - Eastern Shore* |
| Lincoln University* | Virginia State University* |
| | West Virginia State University* |

| **1994 Designation (35 total)** | |
|---|---|
| Aaniiih Nakoda College | Little Priest Tribal College |
| Bay Mills Community College | Navajo Technical University |
| Blackfeet Community College | Nebraska Indian Community College |
| Cankdeska Cikana Community College | Northwest Indian College |
| Chief Dull Knife Community College | Nueta Hidatsa Sahnish College |
| College of Menominee Nation | Oglala Lakota College |
| College of the Muscogee Nation | Red Lake Nation College, Red Lake |
| Dine College | Saginaw Chippewa Tribal College |
| Fond Du Lac Tribal & Community College | Salish Kootenai College |
| Fort Peck Community College | Sinte Gleska University |
| Haskell Indian Nations University | Sisseton Wahpeton Community College |
| Ilisagvik College | Sitting Bull College |
| Institute of American Indian Arts | Southwestern Indian Polytechnic Institute |
| Keweenaw Bay Ojibwa Community College | Stone Child College |
| Lac Courte Oreilles Ojibwa Community College | Tohono O'Odham Community |
| Leech Lake Tribal College | Turtle Mountain Community College |
| Little Big Horn College | United Tribes Technical College |
| | White Earth Tribal and Community College |

Superscript V = hosts accredited College of Veterinary Medicine; Asterisk = Institution is also designated as HBCU

## APPENDIX 2:
## IOAPs (and Resolutions) Identified and Used for Analysis

| University | Live and Archived Links to OA Policies and Resolutions |
|---|---|
| Cornell University (Resolution) | http://wayback.archive-it.org/2566/20130608143253/<br>http://www.library.cornell.edu/scholarlycomm/resolution.html |
| Iowa State University (Resolution) | http://www.facsen.iastate.edu/sites/default/files/uploads/16-17%20Docket%20Calendar/S16-24%20-%20Open%20Access%20at%20ISU%20-%20Senate%20resolution.pdf<br>https://perma.cc/J9VN-DDM5 |
| Massachusetts Institute of Technology | https://libraries.mit.edu/scholarly/mit-open-access/open-access-policy/<br>https://perma.cc/DK6Q-LRX5 |
| Rutgers University | https://web.archive.org/web/20191030010202/http://senate.rutgers.edu/RGPEConS1103onOpenAccessOctober2012.pdf |
| Oregon State University | https://library.oregonstate.edu/open-access<br>https://perma.cc/NF24-TNYG |
| University of Arizona | https://new.library.arizona.edu/research/open-access/policy<br>https://perma.cc/JX48-Y9N2 |
| University of Illinois | https://guides.library.illinois.edu/oapolicy/policy<br>https://perma.cc/WB3W-LWUZ<br>https://www.senate.illinois.edu/sc1512.pdf<br>https://perma.cc/R354-U2RZ |
| University of Arkansas (Resolution) | https://provost.uark.edu/policies/122000.php<br>https://perma.cc/4H53-B3S4 |
| University of California System | https://osc.universityofcalifornia.edu/scholarly-publishing/uc-open-access-policies-background/systemwide-senate/<br>https://perma.cc/S69X-PTX6<br>https://osc.universityofcalifornia.edu/scholarly-publishing/uc-open-access-policies-background/presidential/<br>https://perma.cc/UE67-MRVX |
| University of Delaware | https://guides.lib.udel.edu/scholcom/openaccess<br>https://perma.cc/VQP2-K48N |
| University of Hawaii | https://manoa.hawaii.edu/ovcaa/admin_memos/pdf/memo_04042012_openaccess.pdf<br>https://perma.cc/4BLH-NVAC |
| University of Massachusetts | https://www.library.umass.edu/open-access-policy/<br>https://perma.cc/RK7V-W2CC |
| Utah State University | https://www.usu.edu/policies/586/<br>https://perma.cc/G5DS-CGUQ |

**(Table continues on following page)**

| University | Live and Archived Links to OA Policies and Resolutions |
|---|---|
| University of Minnesota | https://policy.umn.edu/research/scholarlyarticles<br>https://perma.cc/T7NX-WQFB |
| University of New Hampshire (Resolution) | https://www.unh.edu/sites/www.unh.edu/files/departments/faculty_senate/documents/motions/2009-10/openaccess_signed-xiv-m14-3-22-2010.pdf<br>https://perma.cc/9NS3-KSRE |
| University of Rhode Island | https://uri.libguides.com/c.php?g=42596&p=269438 https://perma.cc/HA8W-MLXA |
| Penn State University | https://openaccess.psu.edu/<br>https://perma.cc/NK7A-8J4E |
| Virginia Tech | https://sites.google.com/a/vt.edu/cor-oa-policy-working-group/<br>https://perma.cc/7BTX-BRZV |
| University of Maryland | https://pact.umd.edu/sites/default/files/2022-04/Equitable_Access_Policy_Senate_Version_2022_0406.pdf<br>https://perma.cc/LU4E-S8Y8 |

## APPENDIX 3:
## Institutional and Policy Scopes

How many universities are included in the 15 land grants with IOAPs? An analysis that seeks to account for land-grant IOAP adoption rates must contend with complexity in definitions of these modern research universities, which comprise multiple affiliated campuses, systems, or stand-alone institutions; their land-grant status designations; and the scope of their IOAP policy. The institution identified in land-grant designation may not prove to be a 1:1 with the institution adopting an IOAP. For example, the USDA lists the University of Hawaii (UH) as a land grant; APLU further specifies University of Hawaii (Honolulu, HI). UH is a system of 3 universities and 7 community colleges. The flagship campus, University of Hawaii at Manoa (UHM), has passed an open access policy that applies only to UHM faculty. The ten schools in the UC system are considered in aggregate by the USDA as land grant and listed as such. The University of California San Francisco (UCSF) passed an open access policy in their academic senate in 2012, a precursor to the two OA policies adopted at the UC system level in 2013 and 2015.

Distinctions at the level of campus, university, and system take on greater importance in analyses of the scope and impact of an IOAP. The UC system is made up of 10 institutions that, when considered collectively, have the largest student population and the highest expenditures of the study population.

| University | Land-Grant Designation and OA Policy Scope |
|---|---|
| Massachusetts Institute of Technology | University-level policy, single university |
| University of Delaware | University-level policy, single university |
| University of Arizona | University-level policy, single university |
| Utah State University | University-level policy, single university |
| University of Rhode Island | University-level policy, single university |
| Oregon State University | University-level policy, single university |
| University of Maryland, College Park | University-level policy, single university[22] |
| Virginia Polytechnical & State University | University-level policy, single university with multiple campuses |
| University of Massachusetts Amherst | University-level policy, single university<br>University of Massachusetts Amherst, the land-grant and flagship campus within the University of Massachusetts system, passed an IOAP. |
| University of California System | System level-policy, multiple universities<br>UC system designated as land-grant; all 10 universities in the system fall under the IOAP. |

*Alignment of Land-Grant Designation and OA Policy Scope: Institutions with 1:1 or coextensive relationship between land-grant designation and OA policy scope*[23]

The University of California's policy is clearly a system-level policy that governs all 10 schools, so for purposes of this analysis, those institutions will be considered both separately and in aggregate. Rutgers and Penn State are somewhat similarly situated, as both have an IOAP extending to the entire system of 4 campuses and 23 campuses, respectively. The IOAPs at Rutgers and Penn State were not explicit about which campuses were governed by the policies: however, as they were voted on and approved by their corresponding faculty senates and as the faculty senates include voting representatives from each of the individual campuses, it can be assumed that these are system-level policies. Nevertheless, the Rutgers and Penn State systems themselves are not designated as land grants by the federal government and they are

[22] In 2019, University of Maryland began reporting Baltimore and College Park as one research unit to reflect their new strategic partnership (codified through the University of Maryland Strategic Partnership Act passed by the Maryland General Assembly in 2016).

[23] Sources: Institutional policies (see Appendix 2); Croft GK. The U.S. Land-Grant University System: An Overview. Washington, DC; 2019. Report No.: R45897. Available from: https://crsreports.congress.gov/product/pdf/R/R45897; DeGroote S. UI Open Access Policy: About. University of Illinois-Chicago University Library. 2020. Available from: https://researchguides.uic.edu/oapolicy.

| University | Land-Grant Designation | OA Policy Scope |
|---|---|---|
| University of Hawaii | System-level land-grant designation (3 universities, 7 community colleges) | Single-campus policy (applies to UH system flagship, University of Hawaii at Manoa) |
| University of Minnesota | University of Minnesota, St Paul (Twin Cities) designated as land grant | System-level policy (Crookston, Duluth, Morris, Rochester, Twin Cities) |
| Rutgers, The State University of New Jersey | Rutgers University in New Brunswick designated as land grant | System-level policy (including New Brunswick, Newark and Camden)[24] |
| University of Illinois | University of Illinois Urbana-Champaign designated as land grant | System-level policy (including Urbana-Champaign, Springfield, and Chicago) |
| Pennsylvania State University | Pennsylvania State University at University Park designated as land grant | System-level policy (including University Park and all 22 other universities in the system)** |

*Alignment of Land-Grant Designation and OA Policy Scope: Institutions that lack alignment between land-grant designation and OA policy scope*[25]

considered independent institutions (rather than campuses) by both the Department of Education (per IPEDS reporting) and the NSF. Therefore, only the universities in New Brunswick and State College meet the criteria of both land-grant status and having an IOAP and are included in this analysis.

[24] While Penn State's and Rutgers's policies do not explicitly name the affected campuses, the authors infer that these IOAPs apply at the system level, based on observation of other indicators on institutional websites.

[25] Sources: Institutional policies (see Appendix 2); Croft GK. The U.S. Land-Grant University System: An Overview. Washington, DC; 2019. Report No.: R45897. Available from: https://crsreports.congress.gov/product/pdf/R/R45897; DeGroote S. UI Open Access Policy: About. University of Illinois-Chicago University Library. 2020. Available from: https://researchguides.uic.edu/oapolicy.