Cascade Policy
Institute
OREGON

A Proposal To Generate Adequate Returns From Common School Trust Lands

by Eric Fruits, Ph.D.
March 2018

Table of Contents

About the Author

Eric Fruits, Ph.D. is president and chief economist at Economics International Corp., an Oregon based consulting firm specializing in economics, finance, and statistics. He is also an adjunct professor at Portland State University, where he teaches in the economics department and edits the university's quarterly real estate report. His economic analysis has been widely cited and has been published in *The Economist*, the *Wall Street Journal*, and *USA Today*.

Dr. Fruits has been invited to provide analysis to the Oregon legislature regarding the state's tax and spending policies. He has been involved in numerous projects involving natural resources and Oregon forest products such as analysis for *Ross-Simmons v. Weyerhaeuser*, an antitrust case that was ultimately decided by the United States Supreme Court. His testimony regarding the economics of Oregon public employee pension reforms was heard by a special session of the Oregon Supreme Court.

Dr. Fruits has produced numerous research papers in real estate and financial economics, with results published in the *Journal of Real Estate Research*, *Advances in Financial Economics*, and the *Municipal Finance Journal*.

Acknowledgments

About Cascade Policy Institute

Founded in 1991, Cascade Policy Institute is Oregon's premier policy research center. Cascade's mission is to explore and promote public policy alternatives that foster individual liberty, personal responsibility, and economic opportunity. To that end, the Institute publishes policy studies, provides public speakers, organizes community forums, and sponsors educational programs. Cascade Policy Institute is a tax-exempt educational organization as defined under IRS code 501(c)(3). Cascade neither solicits nor accepts government funding and is supported by individual, foundation, and business contributions. Nothing appearing in this document is to be construed as necessarily representing the views of Cascade or its donors. The views expressed herein are the author's own.

Summary of Conclusions

Across the Western States, approximately 80 percent of Trust Lands are managed for the benefit of the states' "common schools"—public primary and secondary (K-12) schools. In most Western States, a Land Board is required to act as a prudent investor and obtain market value from the sale, rental, or use of trust lands. Generally, revenues generated from Trust Lands are deposited into a common schools fund managed by the state's treasurer, an investment board, or a combination of the two.

Rather than running the risk of mismanagement of Trust Land and/or reliance on global commodity prices, states could sell the Trust Lands and place the proceeds in a fund managed by the state's investment managers, with payments to beneficiaries under the states' current distribution approach.

This report uses a Monte Carlo approach to analyze the impacts of such a proposal. The analysis indicates that most of the states analyzed would benefit from a sale of their Trust Lands.

State	Break-Even Value	Estimated Market Value	Recommendation
AZ	$2,719	$70,000	Sell
CO	3,581	n/a	Maintain
ID	600	2,300	Sell
MT	1,871	3,163	Sell
NM	9,115	6,300	Sell
OR	103	701	Sell
UT	1,289	n/a	Likely sell
WA	3,282	n/a	Maintain
WY	2,741	3,107	Sell

Amounts in $ millions

A Proposal To Generate Adequate Returns From Common School Trust Lands

Approximately 73 million acres of state-owned lands are managed by the western states of Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, and Wyoming as Trust Lands. A trust is a legal arrangement whereby control over property is transferred to a person or organization (the trustee) for the benefit of someone else (the beneficiary). As trustee, a state's land board or commission has a fiduciary responsibility to act solely in the interest of the beneficiary.[1] An administrative agency acts under the Land Board's direction to manage the state's Trust Lands.

State	Trustee	Administrator
AZ	Land Commissioner	State Land Department
CO	Land Board	Department of Natural Resources
ID	Board of Land Commissioners	Department of Lands
MT	Board of Land Commissioners	Trust Land Management Division
NM	Commissioner of Public Lands	State Land Office
OR	Land Board	Department of State Lands
UT	School and Institutional Trust Land Board of Trustees	School and Institutional Trust Lands Administration
WA	Commissioner of Public Lands	Department of Natural Resources
WY	Commissioner of Public Lands	Office of State Lands and Investments

Across the Western States, approximately 80 percent of Trust Lands are managed for the benefit of the states' "common schools"—public primary and secondary (K-12) schools, as shown in Table 1. In most Western States, the Land Board is required to act as a prudent investor and is not permitted to divert trust resources to anyone other than the beneficiary. Part of the prudent investor mandate requires obtaining market value from the sale, rental, or use of trust lands.

Appendix A provides a visual description of how revenues from Trust Lands make their way to fund public schools in the Western States. Generally, revenues generated from Common Schools Trust Lands are deposited in a fund, often called the "Common School Fund" or the "Permanent School Fund." The fund is managed by the state's treasurer, an investment board, or a combination of the two.[2]

In some states, especially energy producing states, proceeds from non-renewable resources—royalties and land sales—are placed in the Common School Fund while proceeds from renewable resources—leases, rights-of-way, and interest—are placed in a different fund or distributed to beneficiaries.

State	Investment Manager
AZ	Treasurer
CO	Treasurer
ID	Endowment Fund Investment Board
MT	Board of Investments
NM	Treasurer & Investment Council
OR	Treasurer & Investment Council
UT	Treasurer
WA	Asset Management Council
WY	Board of Land Commissioners

1. For simplicity, this report uses "Land Board" to refer generically to the relevant boards, commissions, or commissioners who are the trustees of Trust Lands.
2. For simplicity, this report uses "Common School Fund" to refer generically to the funds in which proceeds are deposited and "Investment Manager" to refer generically to the entity charged with managing the Common School Fund.

1. Management and performance of Trust Lands

Table 1 summarizes the performance of Trust Lands in the Western States. Revenues are from annual reports published by each state's Land Board. In some cases, states report gross revenues and in other cases, states report revenues net of expenses, raising difficulties to conducting a state-by-state comparison. In addition, expense accounting can be misleading. For example, Washington reports expenses, however these are merely total costs that are allocated to assets according to a formula rather than an accounting of the actual costs associated with a particular asset or class of assets.

Without an accurate accounting of the costs of managing states' Trust Lands, it is difficult—if not impossible—to accurately assess management of the lands. It is possible that some assets or class of assets may be generating positive revenues, but these revenues are outweighed by the costs of managing the assets. States, their Land Boards, and their citizens would benefit from a uniform and accurate accounting of the revenues generated by Trust Lands as well as uniform and accurate accounting of the costs of managing Trust Lands assets.

New Mexico and Wyoming are the "best" performing energy producing states, generating about $23 in revenues per acre of Trust Lands. Arizona and Montana, however, generate less than half that amount. The Montana Trust Lands Management Division's annual report for 2016 identifies declines in oil and natural gas prices for decreases in revenues from leases, lower commodity prices for declining agriculture and grazing revenues, and a drop in stumpage price for reduced timber sales revenues.

The timber states of Washington and Oregon provide a stark contrast with each other. Washington's management of its Trust Lands generate $37 an acre, while neighboring Oregon generates only $4.25 an acre. According to the Oregon Land Board's annual report for the 2016 fiscal year, approximately 118,000 acres of trust lands—15 percent of the state's surface acres—were generating minimal or no revenues for the Common School Fund because of the state's management practices. It is estimated these acres make up about 60 percent of the total asset value of Oregon's Common School trust lands.

The wild range of Trust Land revenues across the Western States as well as wild year-to-year swings in revenues can be attributed to two factors: (1) changes in commodities prices, often driven by global markets, and (2) each state's management policies and practices.

From 2015 to 2016, Trust Land revenues in eight of the nine Western States declined. The annual reports from the Colorado, Montana, New Mexico, Utah, and Wyoming Land Boards attribute the lower revenues to falling prices for oil, natural gas, and other commodities. A letter from Wyoming's treasurer introducing the 2016 annual report explains the impacts:[3]

> I opened the 2015 State Treasurer's Annual Report with some thoughts about the volatility inherent in Wyoming's commodity-based revenue streams. I recounted how the State had experienced the effects of the nearly 50% declined in the prices paid for Wyoming's mineral resources over the course of the year, and how revenue shortfalls would pose substantial challenges for the State going forward into 2016. I wish now I had been wrong!

New Mexico's Commissioner of Public Lands claims that changes to management of the state's Trust Lands have improved revenues generated from rights-of-way, bonus sales, renewable energy, and business leases. The commissioner also indicates that management under previous commissioners created backlogs in applications in the rights-of-way, reducing business interest in applying for rights-of-way and easements, resulting in reduced revenues from rights-of-way:[4]

> Under Commissioner Dunn's administration, revenues to the Land Maintenance Fund—comprised of revenue generated on State Trust Lands through non-oil and gas sources such as grazing fees, rights-of-way, bonus sales, renewable energy and business leases—has increased by nearly $8 million…. This a direct result of Commissioner Dunn's business-minded approach and execution of commonsense management practices across each income producing division within the State Land Office—most notably within the right-of-way division. When he took office, he learned there was an extensive backlog in the right-of-way division. Over 500 applications were still pending, dating back to 2010. Industry was concerned about the excessive amount of time that it took to process applications, which impacted their ability to move job-creating projects forward on State Trust Lands. Since Commissioner Dunn took office, pending applications have decreased by nearly 75 percent as a result of better management…. Commissioner Dunn wants to send a message to any individuals and entities interested in leasing State Trust Lands—whether from the energy sector or not—that the State Land Office is open for business.

---

3. Wyoming State Treasurer. Annual Report for the Period July 1, 2015 Through June 30, 2016. March 2017.
4. New Mexico State Land Office. 2016 Annual Report. January 2017.

Oregon's low Trust Land revenues are due almost entirely to the Land Board's management of the resources. Oregon law states that Trust Lands must be managed for "the greatest permanent value to the state." Over the years, the state has broadened the definition of "greatest permanent value" so that it includes other management goals, such as recreation and protection of habitat. As a result, timber harvests diminished on the state's land, and so have revenues from Trust Lands.

The Annual Report on Common School Fund Real Property for the 2015 fiscal year reports that over the three years from 2013 to 2015, Oregon's Trust Lands real property portfolio had negative income, losing an average of more than $360,000 a year in net operating income.[5] In the 2016 fiscal year, the portfolio's income improved.[6] Department of State Lands staff explained that the 2016 gains were because of one-time sales and a compressed timeline of sales:[7]

> They worked diligently to make sure [generating negative income] was not the case and essentially there was a case of compression where all of the sales that they had modeled out—well if we try to stretch this out to sort of minimize the losses—some of those got moved up as many as we could—given the timeline of the protocol—and we saw a result in a positive. It's important to keep in mind that because of the nature of this forest, a $1.3 million positive could be a single timber sale, or maybe two, and our year-to-year we've seen a single timber sale make the difference between a loss and a gain.

Going forward, the Department of State Lands anticipates the Elliott State Forest, the largest potential source of revenues from Oregon Trust Lands, will lose approximately $1 million a year.[8]

2. Management and performance of Common Schools Funds

Table 2 summarizes the performance of Common School Fund investments in the Western States, as published in the Investment Managers' annual reports for each state. Most states' portfolios are governed by the "prudent investor" rule. The rule provides the investment manager with discretion in making investment decisions, but mandates that an investment strategy have risk and return objectives reasonably suited to the trust. Montana and Colorado do not

allow equity investments. Colorado also does not allow real estate investments.

Figure 1 plots the risk-return tradeoff for Common School Fund investments. The plot demonstrates a well-known observation of portfolio management: higher returns are associated with higher risk and lower returns are associated with lower risk.

The dotted line in Figure 1 is known as the *efficient portfolio frontier*. Portfolios on the dotted line offer the highest expected return for a defined level of risk or the lowest risk for a given level of expected return. Portfolios that lie below the efficient frontier are sub-optimal, because they do not provide enough return for their level of risk or have a higher level of risk for their rate of return.

For example, Montana does not allow equity investments. The addition of equity investments could diversify Montana's portfolio such that the state's Common School Fund could earn higher returns with the same—or lower—overall risk.

Oregon, on the other hand, maintains a diversified portfolio over a wide range of investments including privately held enterprises, publicly traded securities, and real estate. Nevertheless, Oregon's portfolio is the furthest below the efficient portfolio frontier. Both Arizona and Utah are able to simultaneously achieve higher returns and lower volatility than Oregon achieves.

The examples of Montana and Oregon indicate that optimizing portfolio returns is a combination of the rules governing management of the portfolio as well as the management of the portfolio itself.

3. Distributions for Common Schools Funds

Each state has different approaches toward distributing funds to the beneficiaries, as summarized below. The approaches can be put into one of three broad categories: (1) earnings only, leaving the corpus of the Fund intact, (2) a share of the value of the fund, or (3) appropriation by the state legislature.

An approach that distributes only earnings in the Fund while leaving the corpus of the fund intact has the benefit of maintaining the value of the Fund. However, this approach

---

5. Oregon Department of State Lands. Annual Report on Common School Fund Real Property for Fiscal Year 2015, Appendix B. April 12, 2016.
6. Oregon Department of State Lands. Annual Report on Common School Fund Real Property for Fiscal Year 2016, Appendix B and C. May 9, 2017.
7. Paul, James T. Testimony. Senate Committee on Environment and Natural Resources. March 20, 2017.
8. Paul, James T. Testimony. Senate Committee on Environment and Natural Resources. March 20, 2017:
   "That put the Elliott in the position of at best, breaking even, at worst, losing money. And our projections moving forward did not show a change. In that eventually we will be under the status quo, we project we will be losing money every year to the tune of about a million dollars, depending on the holding costs of the property."

State	Distribution Rule
AZ	5 year net return (accounting for inflation) multiplied by the average monthly market value of the preceding five years.
CO	Only interest income. Corpus remains untouched.
ID	Only interest and dividend income. Corpus remains untouched.
MT	95 percent of interest earned.
NM	5 percent of 5 year average of value of fund, including income, contributions, and distributions.
OR	If 3 year average market value increases by less than 11 percent, then 4 percent of 3 year average market value. If 3 year average market value increases by 11 percent or more, then 5 percent of 3 year average market value.
UT	Appropriated by state legislature.
WA	Appropriated by state legislature.
WY	Interest and dividend income. Appropriated by state legislature.

leads to the potential for wild year-to-year swings in the amount distributed to the beneficiaries—and, in some cases, no distributions to the fund in one or more years. In addition, for states that allow all the earnings to be distributed, the Fund would not have an opportunity to grow from investment earnings. Under such an approach, average distributions would not increase over time or with inflation.

An approach that distributes a share of the Fund's outstanding balance provides a relatively stable distribution year over year. On the other hand, in the case of a steep drop in the portfolio value or a series of years in which investment returns are less than the distribution amount, there is a risk that the fund would decrease in value over time. This is, however, a relatively small risk as states taking this approach have set a distribution share that tends to be smaller than the average investment returns on the Fund's portfolio.

As with the portfolio strategies, the distribution approaches represent a risk-return trade-off such that there is no clear indication that one state's distribution approach is better or worse than any other state's approach.

4. An alternative: Sale of state Trust Lands and investment of proceeds

Rather than running the risk of mismanagement of Trust Land and/or reliance on global commodity prices and other supply and demand conditions, the states could sell the Trust Lands and place the proceeds in a fund managed by the state's investment managers, with payments to beneficiaries under the states' current distribution approach. While an actuarial approach tends to assume an annual return that does not vary from year-to-year, in reality investment returns can vary substantially from year-to-year. For investments in which a stable annual payment is expected—such as the annual distributions to K–12 schools—variations in returns can have significant impacts on the annual payments as well and the fund's balance. Thus, instances in which actual returns differ from the actuarially assumed rate of return in any year could result in liabilities far larger than those predicted by an actuarial model that assumes the same rate of return in each and every year.

To understand the effect of variability in investment returns on distributions and the annual balance in the Common School Fund, this analysis uses a Monte Carlo technique to apply a large number of possible sequences of returns, all drawn from a distribution of possible returns with an expected value equal to the returns historically achieved by the state's investment managers. By analyzing the distribution of possible outcomes, it is possible to better evaluate a range of scenarios.

In finance, Monte Carlo methods are widely used and widely accepted to value and analyze complex investments by simulating the uncertainty affecting their value, and then determining their value over the range of resultant outcomes. The technique is employed as follows.

1. The mean and standard deviation of the states' investment managers returns in Table 2 are used to produce a random draw from normal distribution of returns over the next 50 years. This process is repeated 1,001 times to provide a range of potential outcomes and transfers that vary with the year-to-year variations in returns.

2. Distributions are assumed to be made according to current practice as described in Section 3. For states in which distributions are determined by the legislature, this report assumes that the distribution will be equal to the average return for the state's portfolio minus the assumed rate of inflation (2.5 percent).

3. Most states have not undertaken a market valuation of their Trust Lands, if sold. This report calculates a "break even" market valuation for which distributions from the fund in the first 10 years are approximately

State	2016 Revenue	Average Annual Distribution Years 6-10	Years 46-50	Avg. Growth	Balance Beginning	Ending
AZ	$157	$244	$799	7.0%	$2,719	$10,321
CO	131	141	160	0.0%	3,581	3,581
ID	48	59	108	2.0%	600	846
MT	96	124	74	0.1%	1,871	1,972
NM	497	847	4,015	4.7%	9,115	78,650
OR	6	6	10	1.6%	103	210
UT	66	91	108	0.0%	1,289	1,111
WA	111	128	336	2.3%	3,282	10,383
WY	173	245	248	0.0%	2,741	2,659

Amounts in $ millions

the same as current revenues from the states' Trust Lands. This "break even" is not an estimate of actual market value. Rather it represents the *minimum* market valuation required to generate the same revenues currently received.

Conceptually, the sale of Trust Lands and investment of the proceeds is straightforward. The legal reality is more complex. For example, Tom Schulz, Director of Idaho Department of Lands, notes that the state of Idaho is constitutionally prohibited from selling more than one hundred sections of state lands in any one year and from selling more than 320 acres to any one individual, company, or corporation. In addition, he indicates that a large-scale disposition of state lands would likely "suppress markets." These are critical factors that must be evaluated by states considering a sale of Trust Lands.

5. Analysis and results

Appendix B provides a summary of the Monte Carlo results for each of the Western States. Table 1 provides the "break even" market value calculated by the models, where "break even" represents the minimum market valuation required to

generate the same revenues currently received from management of Trust Lands. The table below summarizes the results for the Western States.[9]

Estimated market values for Trust Lands in Arizona, Idaho, Montana, New Mexico, Oregon, and Wyoming have been published and are summarized in Table 1.

- Arizona's state Treasurer indicated in 2013 that the market value of the state's unsold trust land was more than $70 billion, a figure that has been cited several times since then.[10]

- Idaho researchers calculated a value of the state's trust land real estate assets of $2.3 billion in 2010.[11]

- Montana's Department of Natural Resources and Conservation estimates its trust real assets totaled approximately $3.2 billion in the 2014 fiscal year.[12] Shawn Thomas, Administrator for the Trust Lands Division at the Montana Department of Natural Resources and Conservation indicated that this is a "broad estimate" of "general asset values" and should not be relied upon as a "very robust" land valuation. He indicated that such a valuation is not available.

9. For some states, distributions are based on 3-year or 5-year average fund values. For this reason, years 6–10 are used as the beginning time frame.
10. Johnson, Nicholas. New legislation could mean more education spending in K-12, some say less money for future. *Arizona Daily Wildcat*. January 31, 2016.
Cochise County School Superintendent's Office. *The County School Connection*. April 2016.
Knaub, Mara. Treasurer: State has put its "financial house in order." *The Sun*. March 22, 2013.
11. O'Laughlin, Jay, Stanley F. Hamilton, and Philip S. Cook. *Idaho's Endowment Lands: A Matter of Sacred Trust*, 2nd ed. University of Idaho, College of Natural Resources, Policy Analysis Group. August 2011.
12. Montana Department of Natural Resources and Conservation, Trust Land Management Division. Montana State Trust Lands Return on Assets FY 2014. 2015.

- New Mexico's trust lands have been valued between $6.2 billion and $6.4 billion in 2012.[13]

- Oregon's trust land real property has an estimated market value of $701 million, according to the state's Department of State Lands.[14]

- Wyoming trust lands were valued at $3.1 billion in 2002, according to peer-reviewed published academic research.[15]

In each state—with the exception of New Mexico—the estimated market value is greater than the "break even" market value calculated by the Monte Carlo models. This indicates that for these states, the market value from a sale of Trust Lands would generate more resources than the amount necessary to generate the same level of revenues that states are currently receiving. More importantly, it indicates that a sale of trust lands would result in more revenues for K–12 schools than states' Common School Funds are currently providing.

State	Break-Even Value	Estimated Market Value	Recom- mendation
AZ	$2,719	$70,000	Sell
CO	3,581	n/a	Maintain
ID	600	2,300	Sell
MT	1,871	3,163	Sell
NM	9,115	6,300	Sell
OR	103	701	Sell
UT	1,289	n/a	Likely sell
WA	3,282	n/a	Maintain
WY	2,741	3,107	Sell

Amounts in $ millions

In different respects Oregon and Colorado are outliers. Oregon's management of its Trust Lands—especially its forest resources—has led to the lands generating relatively little revenue. Because market value is determined by the potential for improved management of the state's Trust Lands, the market value is much higher than the "break even" value that would generate the same revenues from investments. The Monte Carlo estimates indicate that Oregon could generate at least seven times more income from investment income than it is currently receiving from its management of Trust Lands.

In contrast, Washington appears to be generating more revenues per acre from active management of its Trust Lands than it could achieve from investing proceeds from a sale of its lands. Angus Brodie, Deputy Supervisor for State Uplands, indicated that per-acre market values are not available, making it impossible to determine what return the state is receiving on its Trust Land assets. In addition, because Washington appears to be on the efficient portfolio frontier for its investments, it is unlikely the state could increase its investment returns without also increasing the volatility of its investments.

At the other end of the spectrum, because of Colorado's legal limitations on investment opportunities, the state is likely to generate more revenues from its management of Trust Lands than it would receive in investment earnings. In the absence of better investment returns, Colorado's K–12 schools appear to have better revenues under the status quo.

There is not sufficient information to determine whether Utah would benefit from selling their Trust Lands and investing the proceeds. However, given the relatively low "break even" amount needed to generate similar revenues, it is more likely than not that Utah would benefit from a sale of its Trust Lands.

13. Advantage Business Consulting. Analysis of transferring resources from New Mexico's Land Grant Permanent Fund to early childhood education. January 2014.
14. Oregon Department of State Lands. Annual Report on Common School Fund Real Property for Fiscal Year 2015, Appendix C. April 12, 2016. The Annual Report provides no asset value for special stewardship lands and for sub-surface mineral and energy resources. Asset values for these lands are calculated in the table by applying a 0.2 percent return on asset value to net operating income.
15. Sunderman, Mark A., Ronald W. Spahr, and Samuel Runyan. A relationship of trust: Are state "School Trust Lands" being prudently managed for the beneficiary? Journal of Real Estate Research, 26(4), pp. 345-370.

Table 1

State trust land revenues/income, total

Year	AZ	CO	ID	MT	NM	OR	UT	WA	WY
2006	$374,700,000		$50,700,000			$4,900,000	$142,300,000	$114,900,000	$188,400,000
2007	332,300,000		58,300,000		$475,800,000	7,600,000	128,300,000	136,400,000	183,200,000
2008	382,400,000		55,300,000		546,200,000	5,300,000	133,100,000	98,800,000	208,600,000
2009	247,000,000		42,500,000		536,500,000	8,700,000	112,200,000	135,800,000	197,900,000
2010	155,400,000		25,600,000	$177,400,000	420,300,000	5,800,000	90,900,000	100,900,000	233,500,000
2011	190,300,000		43,700,000	105,600,000	499,200,000	4,500,000	92,800,000	167,900,000	314,500,000
2012	213,200,000	$141,200,000	42,400,000	111,600,000	652,300,000	10,800,000	96,700,000		232,900,000
2013	318,600,000	119,800,000	51,900,000	115,500,000	577,500,000	2,300,000	106,400,000	99,700,000	223,000,000
2014	186,300,000	166,500,000	66,000,000	114,400,000	739,500,000	3,600,000	138,900,000	140,700,000	239,800,000
2015	203,300,000	184,900,000	55,200,000	109,100,000		4,200,000	109,200,000	97,200,000	243,300,000
2016	157,100,000	130,600,000	48,300,000	95,800,000	497,000,000	6,400,000	65,900,000	110,700,000	172,900,000
Mean	**$251,000,000**	**$148,600,000**	**$49,100,000**	**$118,500,000**	**$549,400,000**	**$5,800,000**	**$110,600,000**	**$120,300,000**	**$221,600,000**
Std. Dev.	**85,600,000**	**26,700,000**	**10,600,000**	**26,800,000**	**96,900,000**	**2,400,000**	**23,500,000**	**23,800,000**	**39,200,000**
Trend	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*	*(sparkline)*

Acres (2016)

	AZ	CO	ID	MT	NM	OR	UT	WA	WY
Total	11,000,000	6,800,000	2,400,000	11,400,000	21,600,000	1,500,000	7,800,000	3,000,000	7,400,000
Common schools	9,400,000	6,500,000	2,100,000	10,200,000	16,600,000			1,800,000	6,400,000
% Common schools	85%	96%	88%	89%	77%			60%	86%

Revenues per acre (2016)

	AZ	CO	ID	MT	NM	OR	UT	WA	WY
	$14.25	$19.25	$20.25	$8.50	$23.00	$4.25	$8.50	$37.00	$23.25

Break-even market value

	AZ	CO	ID	MT	NM	OR	UT	WA	WY
	$2,719,000,000	$3,581,000,000	$600,000,000	$1,871,000,000	$9,115,000,000	$103,000,000	$1,289,000,000	$3,282,000,000	$2,741,000,000
Per acre	$245	$525	$250	$165	$420	$70	$165	$1,095	$370

Estimated market value

	AZ	CO	ID	MT	NM	OR	UT	WA	WY
	$70,000,000,000		$2,300,000,000	$3,163,000,000	$6,300,000,000	$701,000,000			$3,107,000,000
Per acre	$6,375		$950	$275	$300	$475			$475
Year of estimate	(2013)		(2010)	(2014)	(2012)	(2016)			(2002)

Table 2

Common school fund investment returns

Year	AZ	CO	ID	MT	NM	OR	UT	WA	WY
1990					9.3%				
1991					11.3%				
1992					14.9%				
1993					12.4%				
1994					-0.2%				
1995					16.2%				
1996					11.5%				
1997					19.2%				
1998					20.4%				
1999					15.7%				
2000					10.2%	-3.6%			
2001					-6.5%	-7.1%			
2002				12.4%	-8.8%	-11.2%		8.4%	7.2%
2003				7.1%	3.3%	24.7%		10.4%	12.3%
2004				5.5%	14.1%	11.7%		0.5%	4.8%
2005				4.2%	9.5%	7.1%		6.3%	8.7%
2006				5.2%	10.4%	15.3%		-0.2%	6.0%
2007		5.2%	0.1%	6.8%	17.9%	2.8%		7.0%	14.9%
2008		5.2%	-15.8%	1.3%	-3.8%	-32.4%		6.9%	2.3%
2009		5.1%	15.8%	10.4%	-22.4%	30.4%		4.3%	-13.3%
2010	11.7%	4.9%	24.6%	8.4%	14.4%	13.0%	12.2%	9.6%	11.8%
2011	3.0%	4.6%	1.0%	8.0%	22.4%	-2.1%	2.3%	5.1%	17.5%
2012	11.2%	4.1%	14.4%	6.8%	0.7%	15.5%	13.5%	7.0%	2.0%
2013	19.2%	3.6%	18.8%	-0.3%	13.3%	17.9%	20.2%	4.0%	8.5%
2014	8.5%	3.2%	3.0%	6.9%	15.7%	6.7%	8.7%	10.0%	12.5%
2015	0.4%	3.0%	0.2%	1.8%	3.5%	0.5%	2.2%	2.9%	3.0%
2016	10.8%	2.6%	12.9%	4.0%	0.4%	6.1%	0.9%	5.0%	1.4%
Mean	**9.2%**	**4.2%**	**7.5%**	**5.9%**	**8.3%**	**5.6%**	**8.6%**	**5.8%**	**6.6%**
Std. Dev.	**6.2%**	**1.0%**	**11.9%**	**3.4%**	**10.3%**	**14.8%**	**7.2%**	**3.2%**	**7.4%**
2010-16									
Mean	9.2%	3.7%	10.7%	5.1%	10.1%	8.2%	8.6%	6.2%	8.1%
Std. Dev.	6.2%	0.9%	9.5%	3.3%	8.5%	7.6%	7.2%	2.7%	6.2%

Investment policy

Equities
Private equity
Real estate
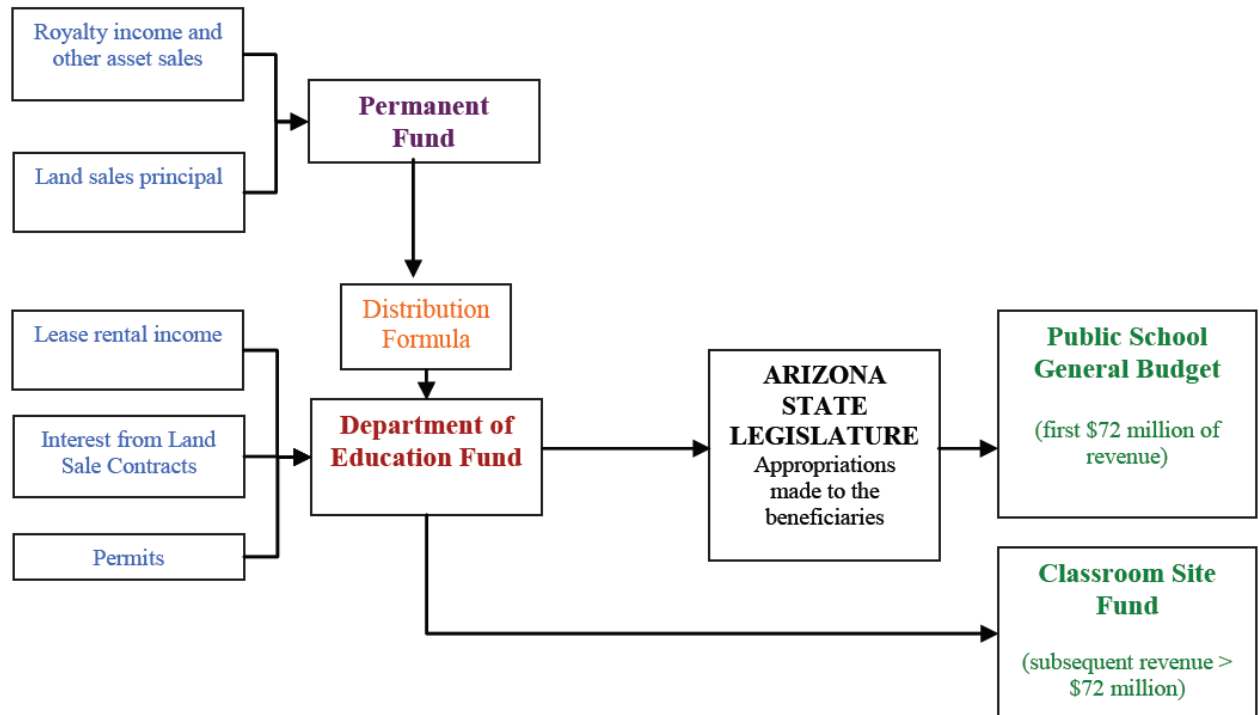Treasuries
Fixed income

Figure 1

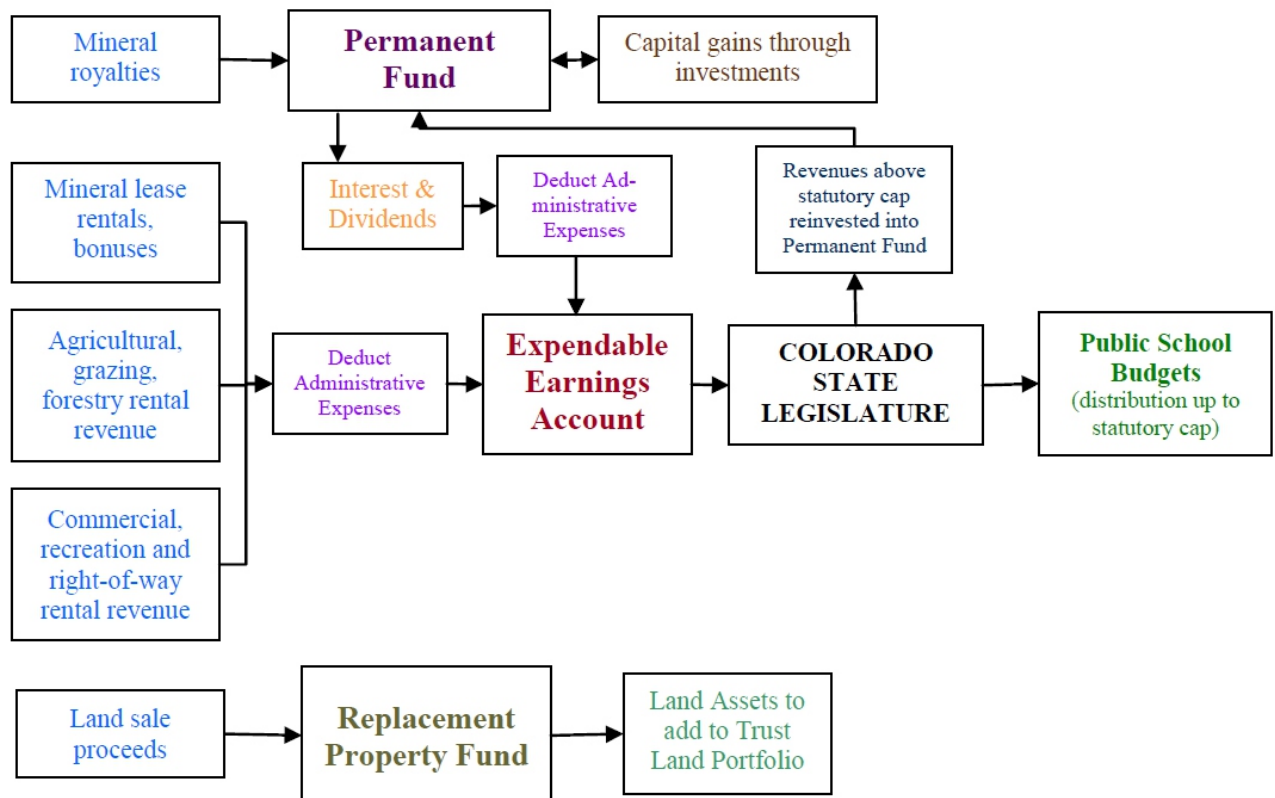# Risk and returns of common school fund investments, 2010–16

States below the dotted line could achieve some combination of:
- Higher returns with the same risk, and/or
- Lower risk with the same returns

Risk – Standard Deviation

Average Return
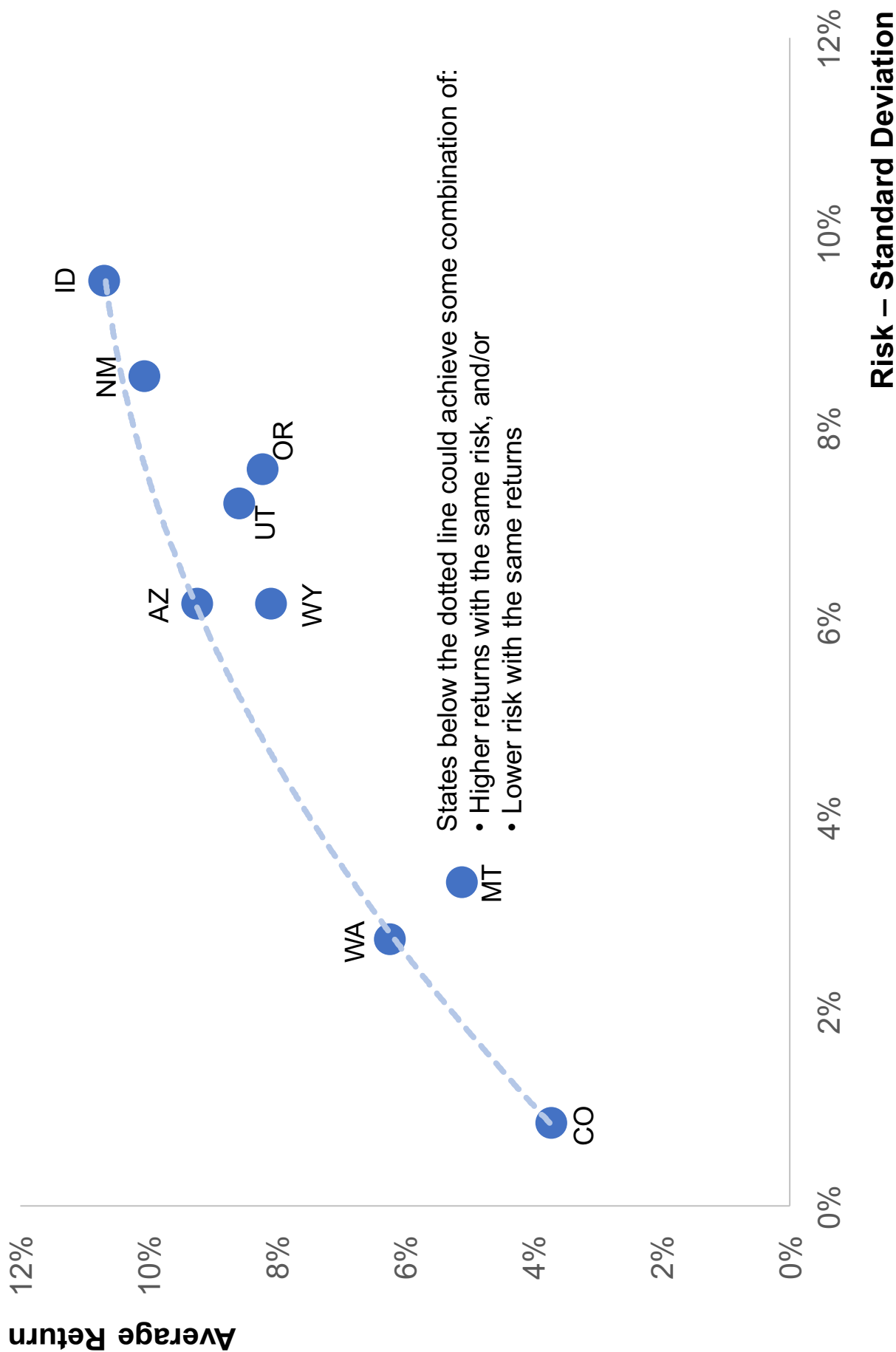
Source: Sonoran Institute/Lincoln Institute of Land Policy Joint Venture and Children's Land Alliance Supporting Schools (CLASS). 2007.
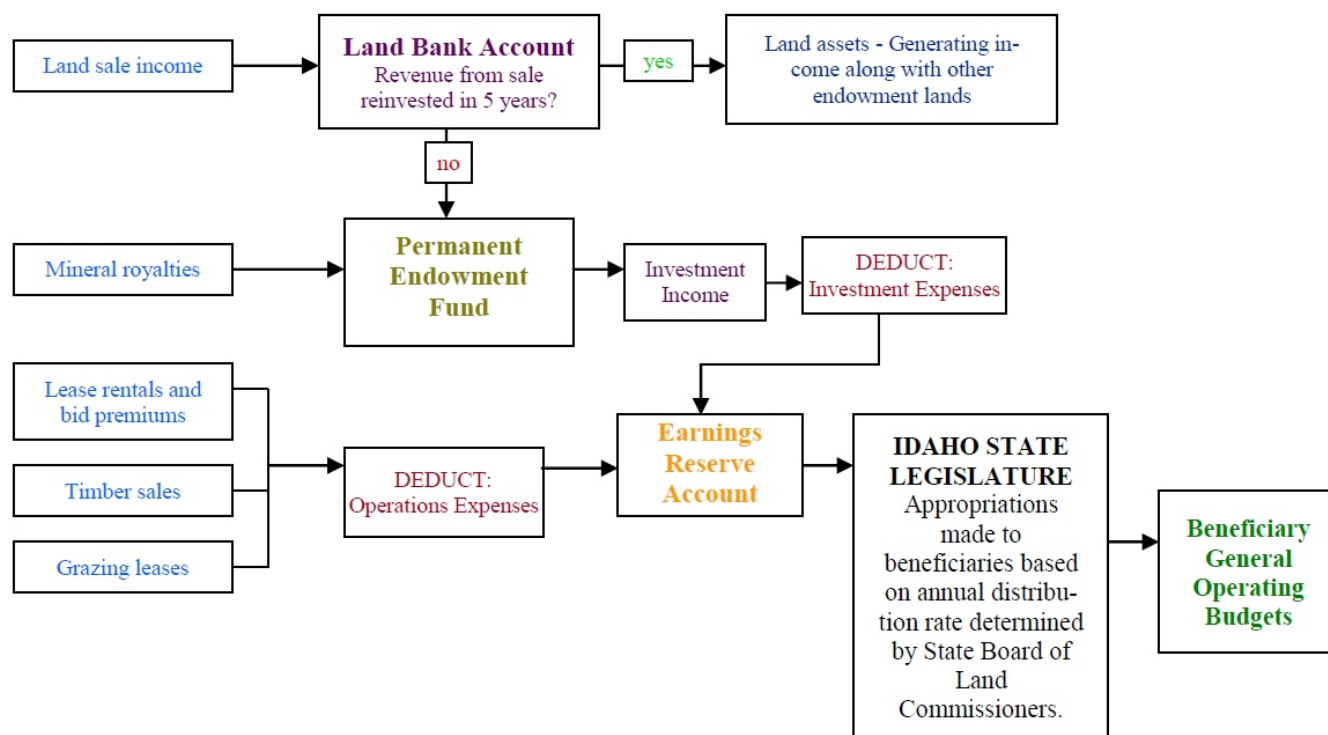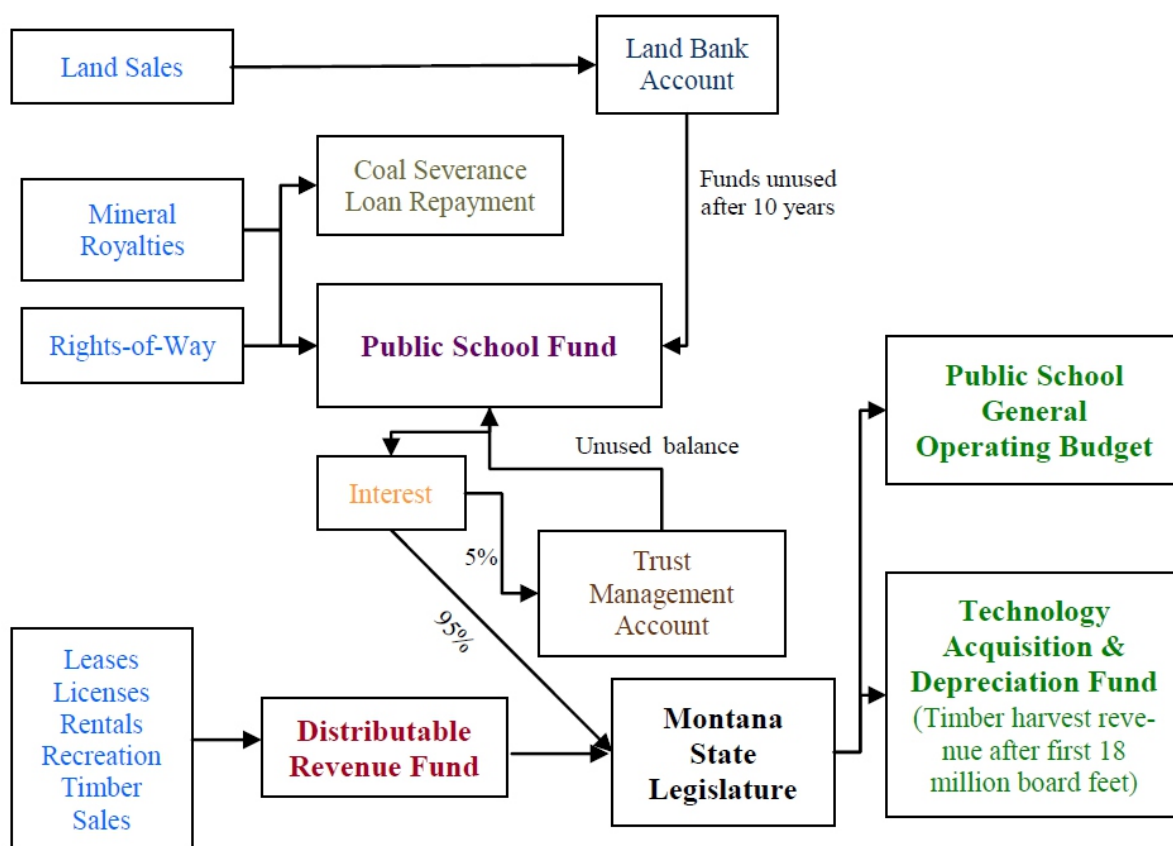
Arizona

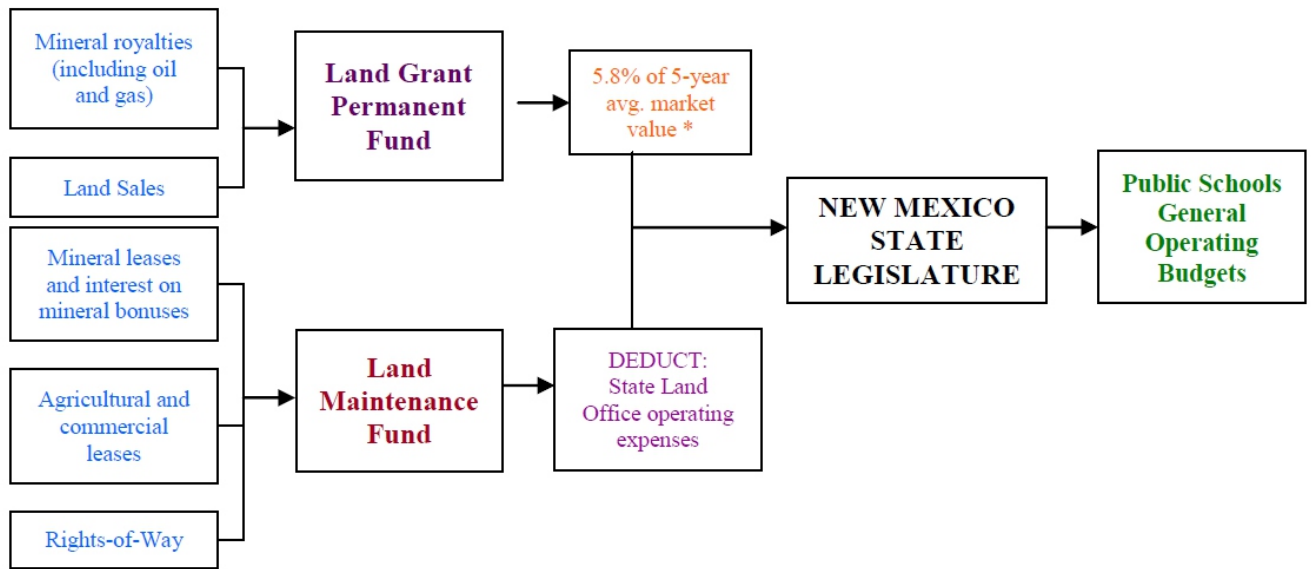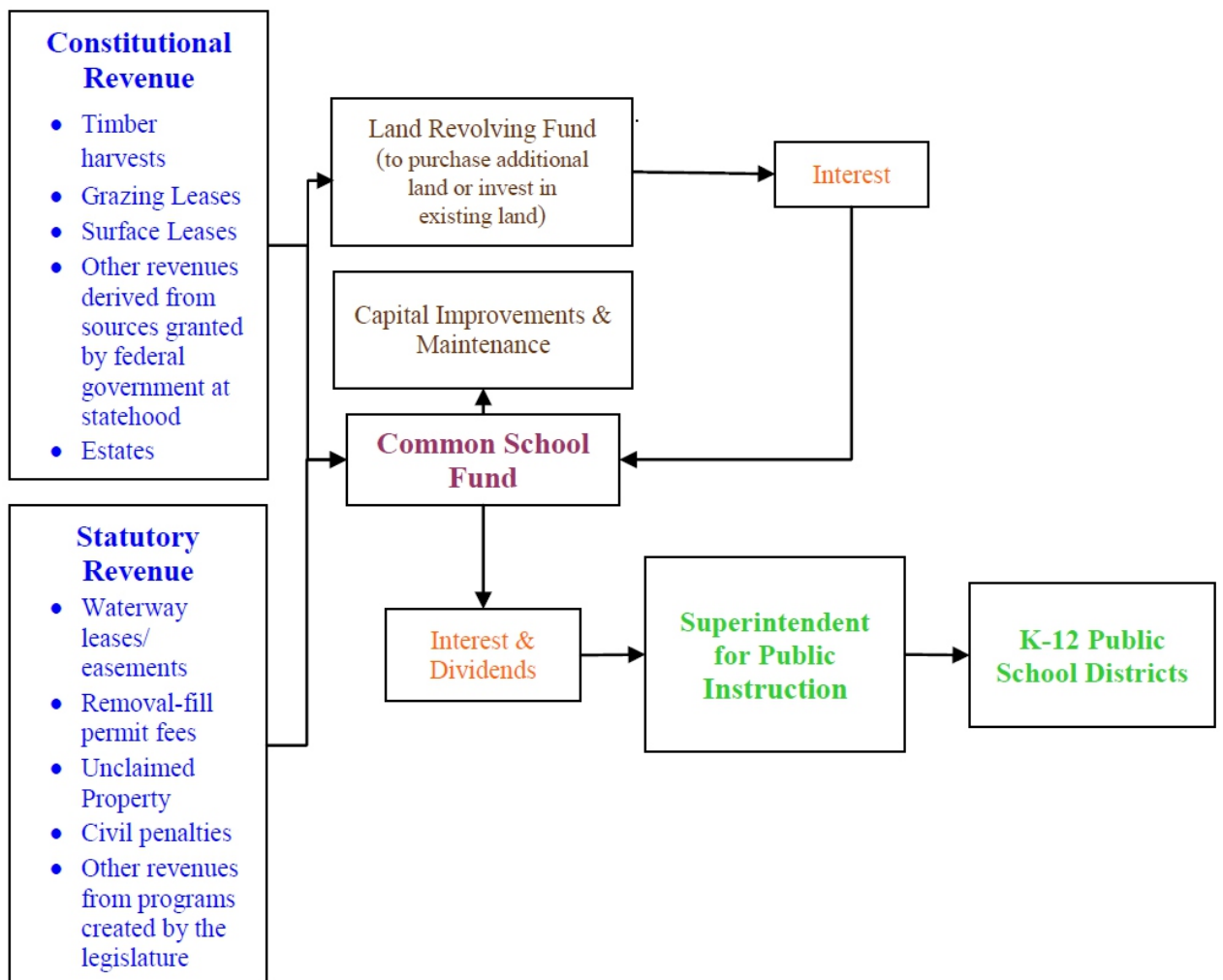## Colorado

Idaho

Montana

New Mexico

- Mineral royalties (including oil and gas) → Land Grant Permanent Fund
- Land Sales → Land Grant Permanent Fund
- Land Grant Permanent Fund → 5.8% of 5-year avg. market value *
- Mineral leases and interest on mineral bonuses → Land Maintenance Fund
- Agricultural and commercial leases → Land Maintenance Fund
- Rights-of-Way → Land Maintenance Fund
- Land Maintenance Fund → DEDUCT: State Land Office operating expenses
- 5.8% of 5-year avg. market value * → NEW MEXICO STATE LEGISLATURE
- DEDUCT: State Land Office operating expenses → NEW MEXICO STATE LEGISLATURE
- NEW MEXICO STATE LEGISLATURE → Public Schools General Operating Budgets

Oregon

Constitutional Revenue
- Timber harvests
- Grazing Leases
- Surface Leases
- Other revenues derived from sources granted by federal government at statehood
- Estates

Statutory Revenue
- Waterway leases/ easements
- Removal-fill permit fees
- Unclaimed Property
- Civil penalties
- Other revenues from programs created by the legislature

Land Revolving Fund (to purchase additional land or invest in existing land) → Interest

Capital Improvements & Maintenance

Common School Fund

Interest & Dividends → Superintendent for Public Instruction → K-12 Public School Districts
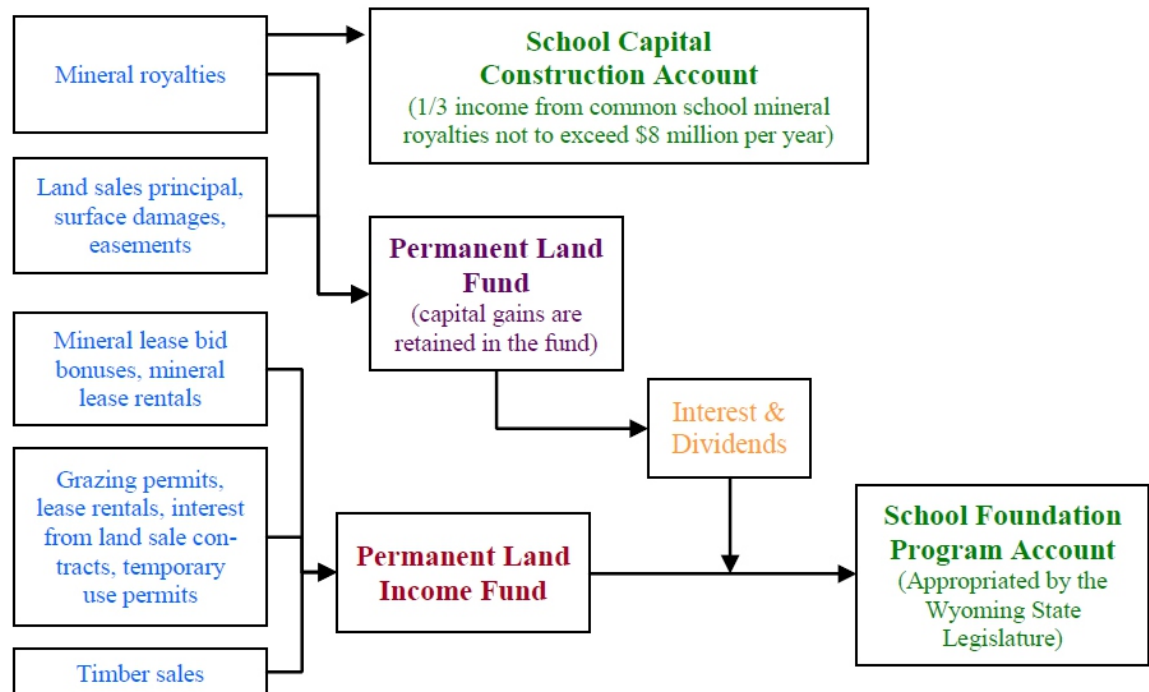
Utah

Washington

Wyoming

Appendix B: Monte Carlo results

The model assumes proceeds from the sale of Trust Lands would be placed in a fund managed by each state's Investment Manager. Distributions from the fund would be made according each state's policies identified in Section 3. For states without mandated distribution formulae, distributions are assumed to be made to allow for annual distributions to grow with projected inflation of 2.3 percent a year. Because of states' distribution policies, the amount earned on investments may be substantially different from the amount distributed to schools.

Each page of the appendix presents the results for a state.

"Investment return" and "standard deviation" refer to the mean annual return on the state's Common School Fund investments and the standard deviation of the investment returns.

The top figure, "Projected annual distribution" shows the projected distributions to the state's public schools.

- The blue line represents the annual distributions for the median of 1,001 Monte Carlo results for each of 50 years.

- The gray line represents the annual distributions, assuming constant investment returns equal to the state's mean annual return on Common School Fund investments (i.e., no year-to-year variation in investment returns).

- The trend in the blue line should approximate the trend in the gray line.

The bottom figure, "Projected year-end fund balance" shows the projected amount in the Common School Fund at the end of each year.

- The blue line represents the year-end balance for the median of 1,001 Monte Carlo results for each of 50 years.

- The gray line represents the year-end balance, assuming constant investment returns equal to the state's mean annual return on Common School Fund investments (i.e., no year-to-year variation in investment returns).

- The trend in the blue line should approximate the trend in the gray line.

For example,

- Oregon's Trust Lands have generated an average of $5.8 million in revenues over the years 2006 through 2016 (Table 1).
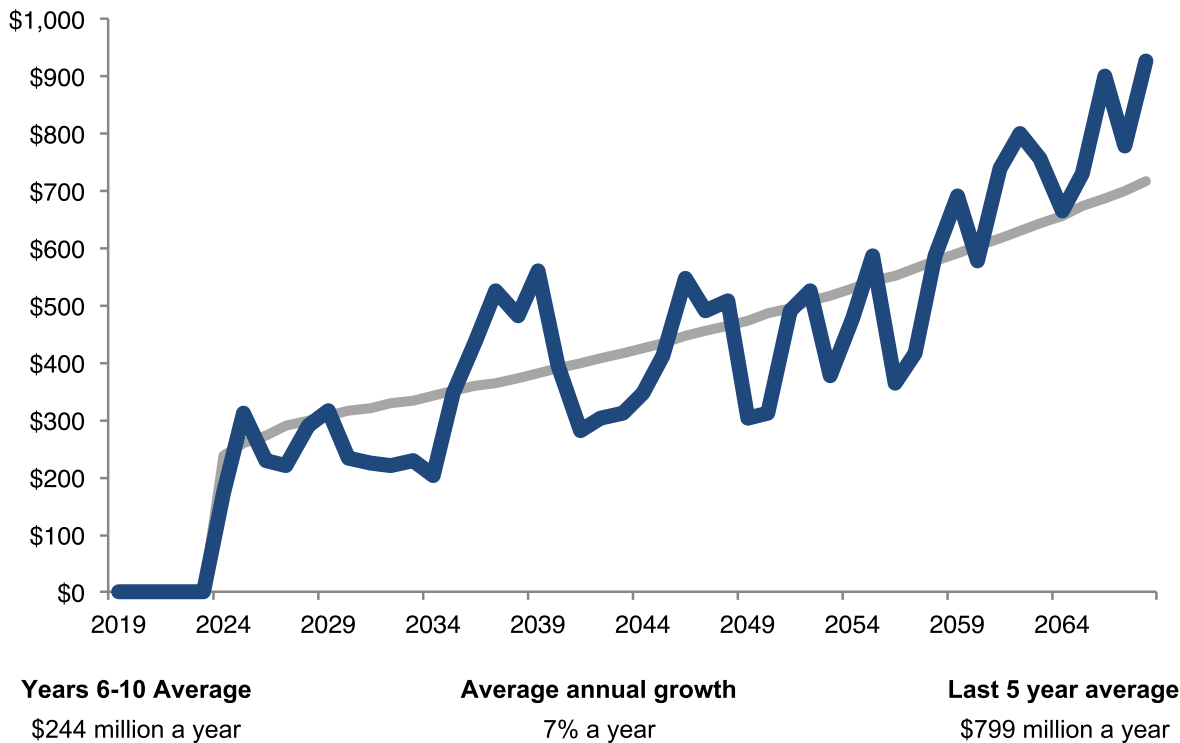
- The top figure of the Monte Carlo results presented in this appendix indicates that if Oregon can obtain at least $103 million for its Trust Lands, returns from investing the proceeds would generate the same revenues the state currently receives from its Trust Lands. The $103 million is a "break even" amount that is determined by the model.

- The state itself estimates the market value of Oregon's trust lands is more than $700 million (Table 1), or about seven times greater than the "break even" amount determined by the model. Thus, the state could generate about seven times the amount it is currently providing to Oregon's public schools.

- The top figure also shows that, under Oregon's distribution policy, funds distributed to public schools would grow by 1.6 percent a year.

- The bottom figure shows that, based on Oregon's history of investment returns and its Common School Fund distribution policy, the balance in the Fund would more than double over the next 50 years.

Because the funds available for Oregon's public schools are significantly larger if the state sold its Trust Lands, the analysis indicates the state should sell the lands and invest the proceeds for the benefit of the state's common schools.
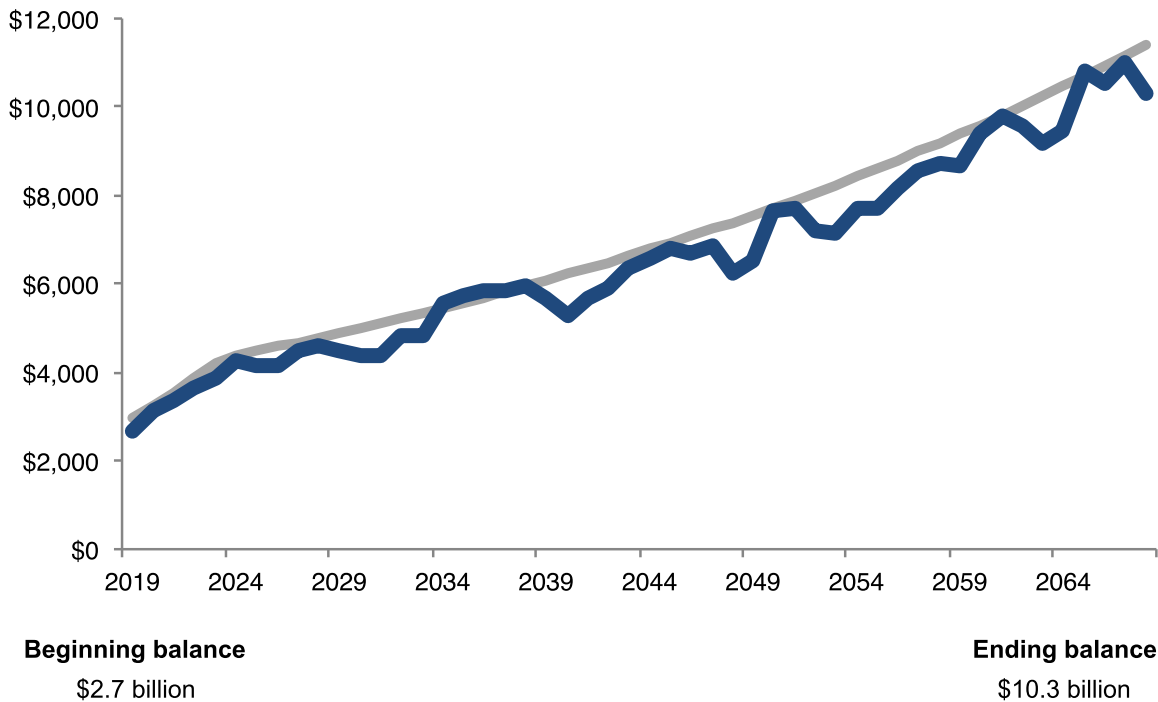
Arizona median result from Monte Carlo simulation

Investment return = 9.2%, standard deviation = 6.2%
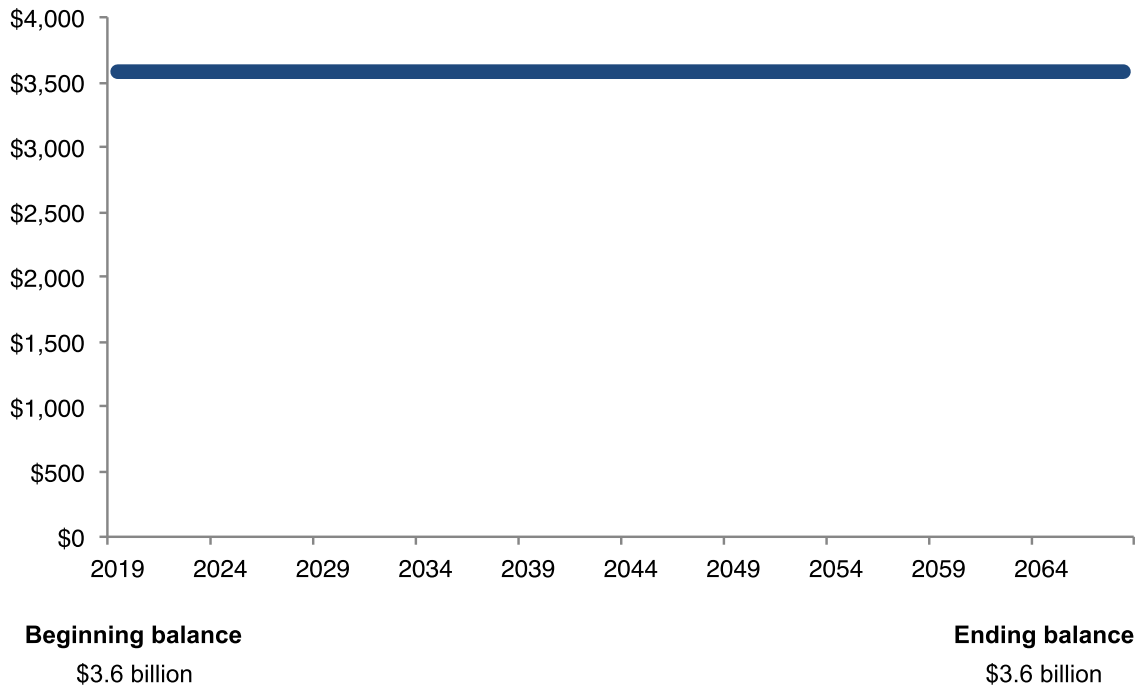
Projected annual distribution ($ million)

Years 6-10 Average	Average annual growth	Last 5 year average
$244 million a year	7% a year	$799 million a year

Projected year-end fund balance ($ million)

Beginning balance	Ending balance
$2.7 billion	$10.3 billion

Blue line represents median result

Gray line represents constant returns of 9.2% a year

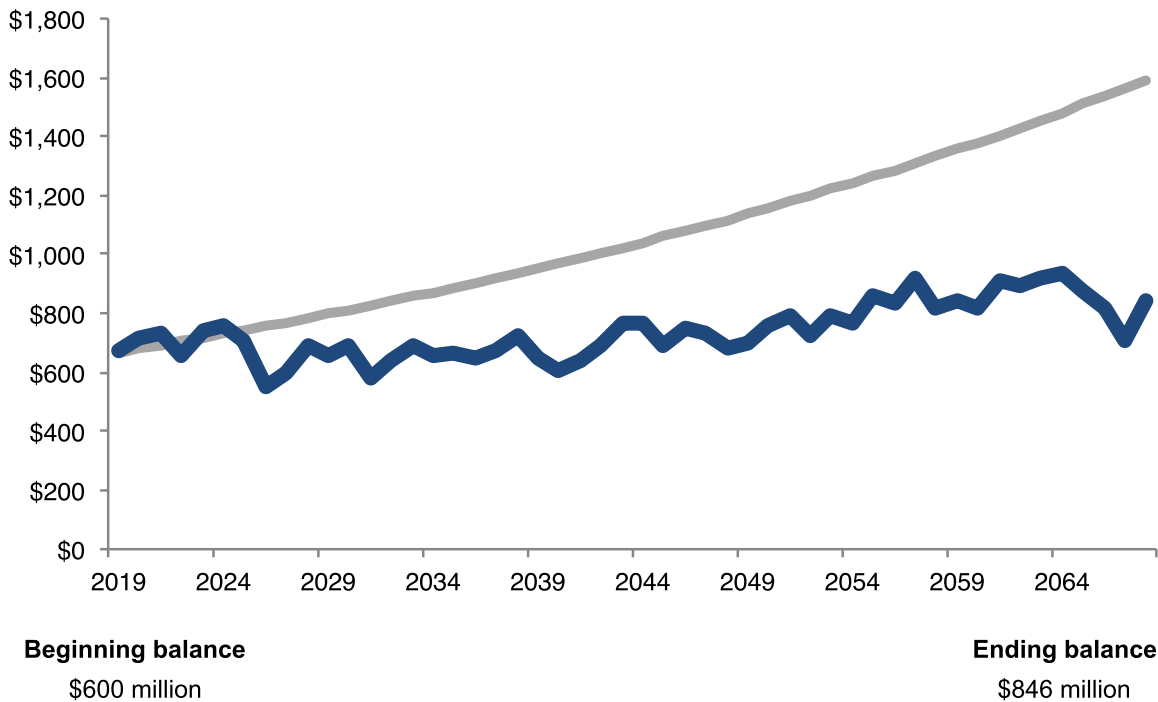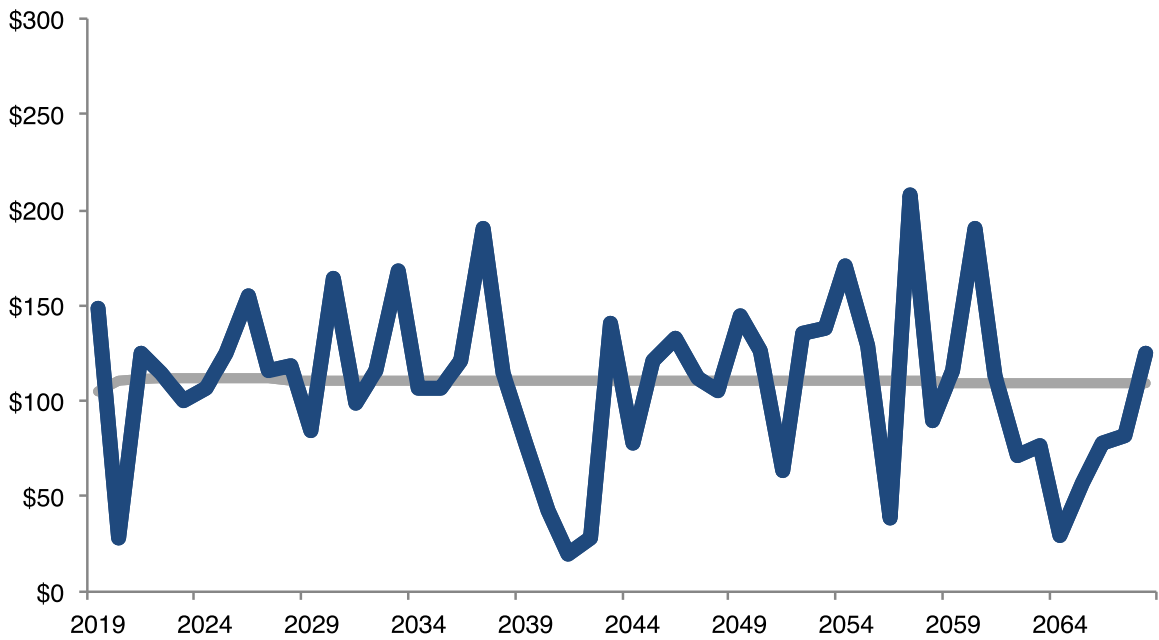# Colorado median result from Monte Carlo simulation

Investment return = 4.2%, standard deviation = 1%

Projected annual distribution ($ million)
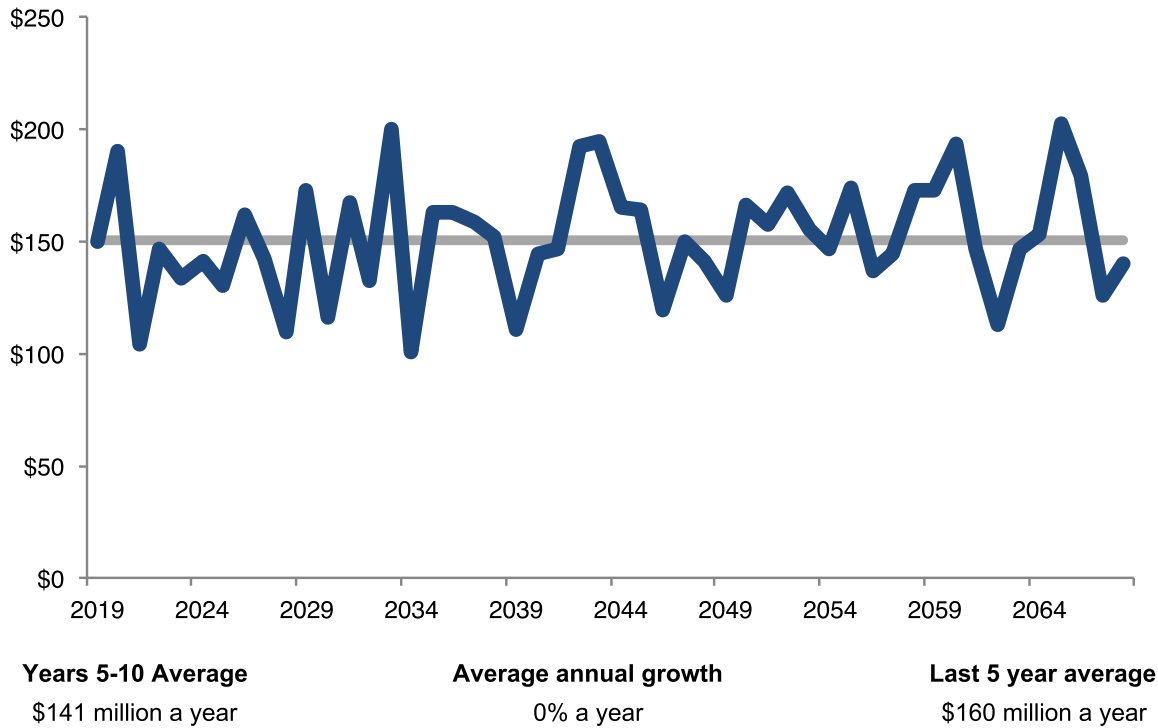
Years 5-10 Average	Average annual growth	Last 5 year average
$141 million a year	0% a year	$160 million a year

Projected year-end fund balance ($ million)

Beginning balance	Ending balance
$3.6 billion	$3.6 billion

Blue line represents median result

Gray line represents constant returns of 4.2% a year

Dotted lines represent median range of results encompassing 50% of scenarios

Idaho median result from Monte Carlo simulation

Investment return = 10.7%, standard deviation = 9.5%

Projected annual distribution ($ million)
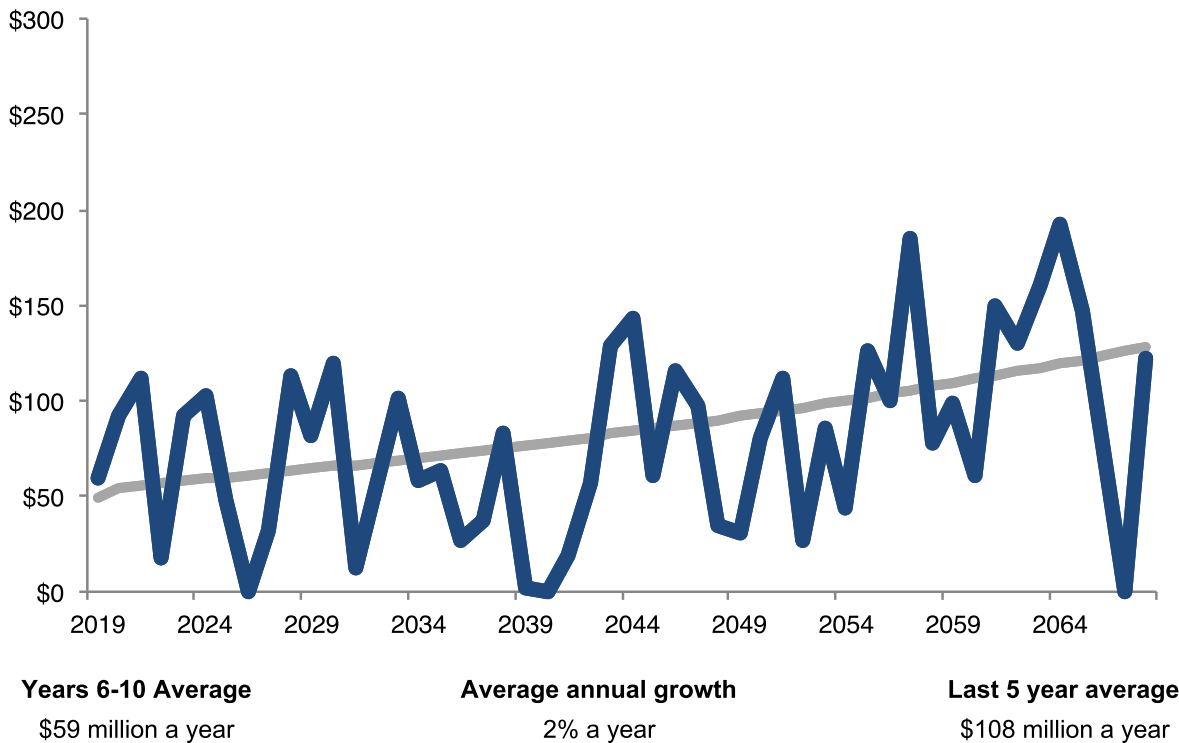

Years 6-10 Average	**Average annual growth**	**Last 5 year average**
$59 million a year	2% a year	$108 million a year

Projected year-end fund balance ($ million)

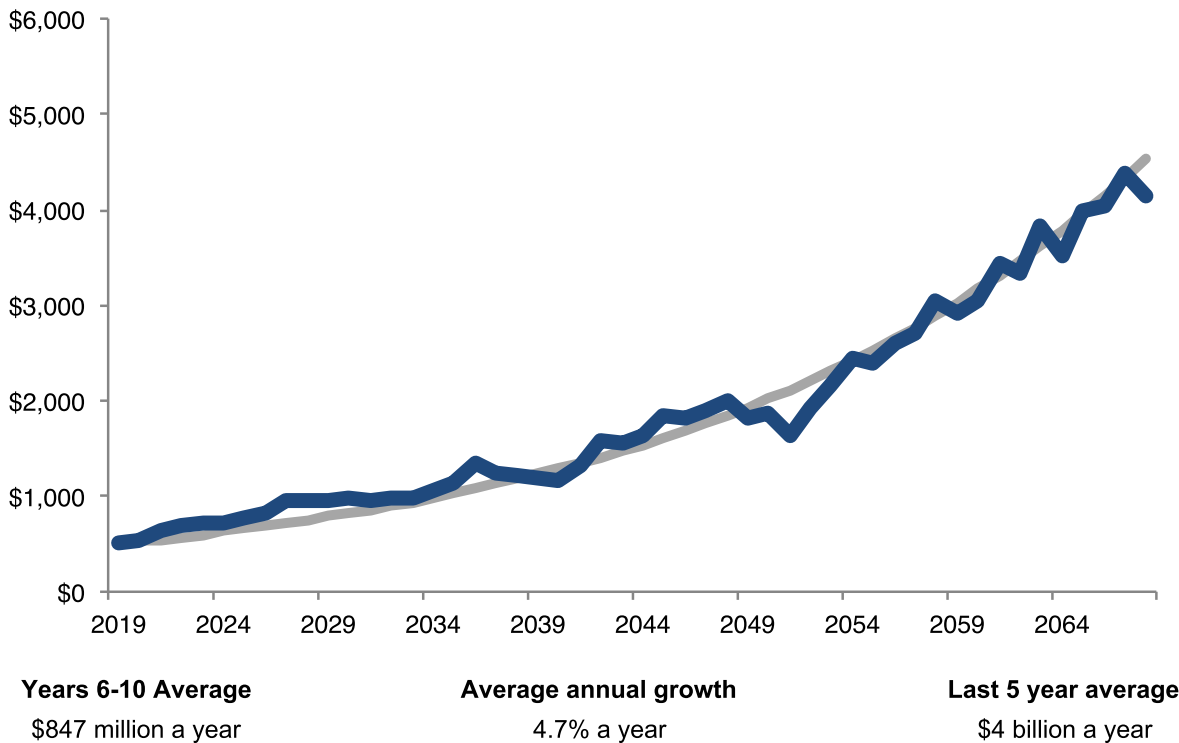| **Beginning balance**	**Ending balance**
$600 million	$846 million

Blue line represents median result

Gray line represents constant returns of 10.7% a year

Montana median result from Monte Carlo simulation

Investment return = 5.9%, standard deviation = 3.4%

Projected annual distribution ($ million)

Years 6-10 Average	Average annual growth	Last 5 year average
$124 million a year	0.1% a year	$74 million a year

Projected year-end fund balance ($ million)
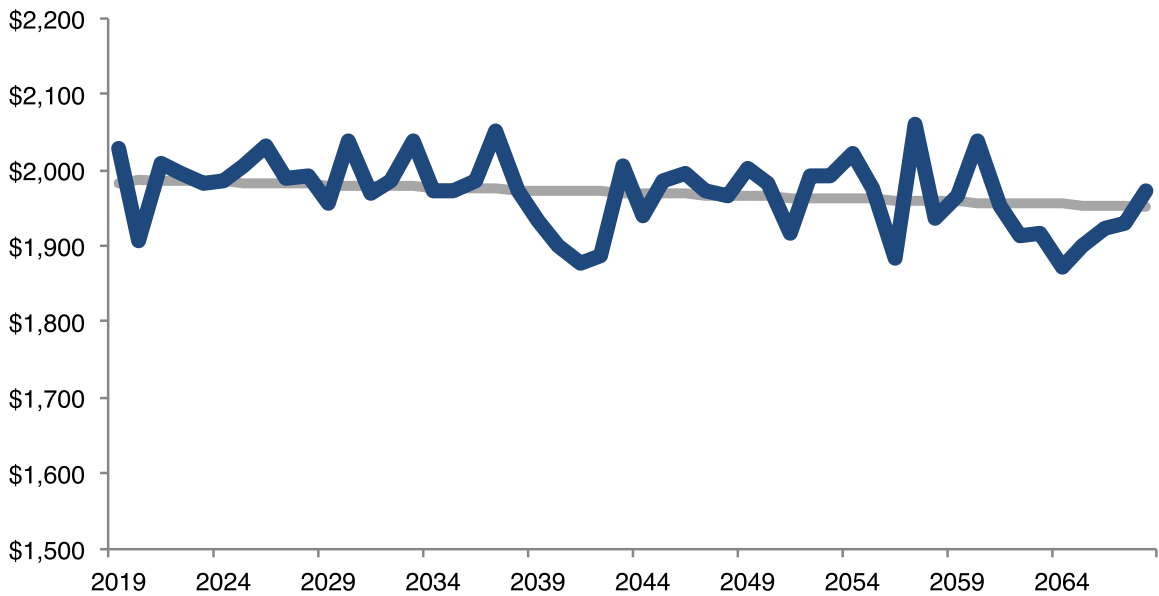
Beginning balance	Ending balance
$1.9 billion	$2 billion

Blue line represents median result

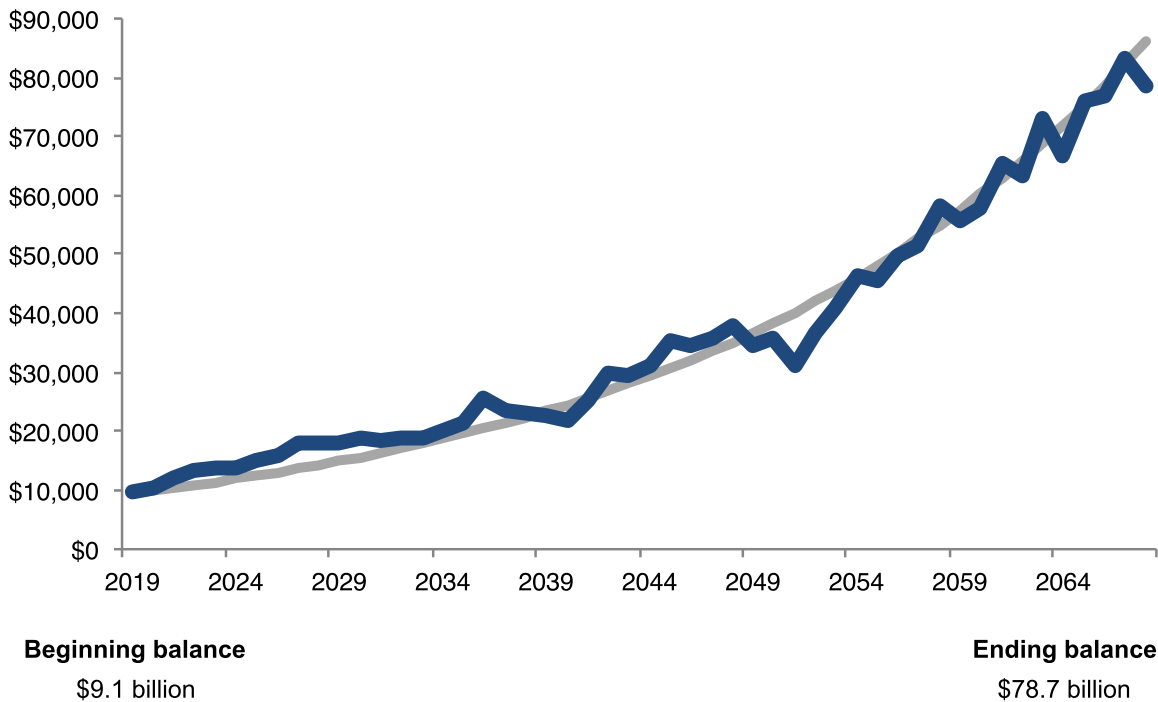Gray line represents constant returns of 5.9% a year

New Mexico median result from Monte Carlo simulation

Investment return = 10.1%, standard deviation = 8.5%

Projected annual distribution ($ million)

Years 6-10 Average	Average annual growth	Last 5 year average
$847 million a year	4.7% a year	$4 billion a year

Projected year-end fund balance ($ million)

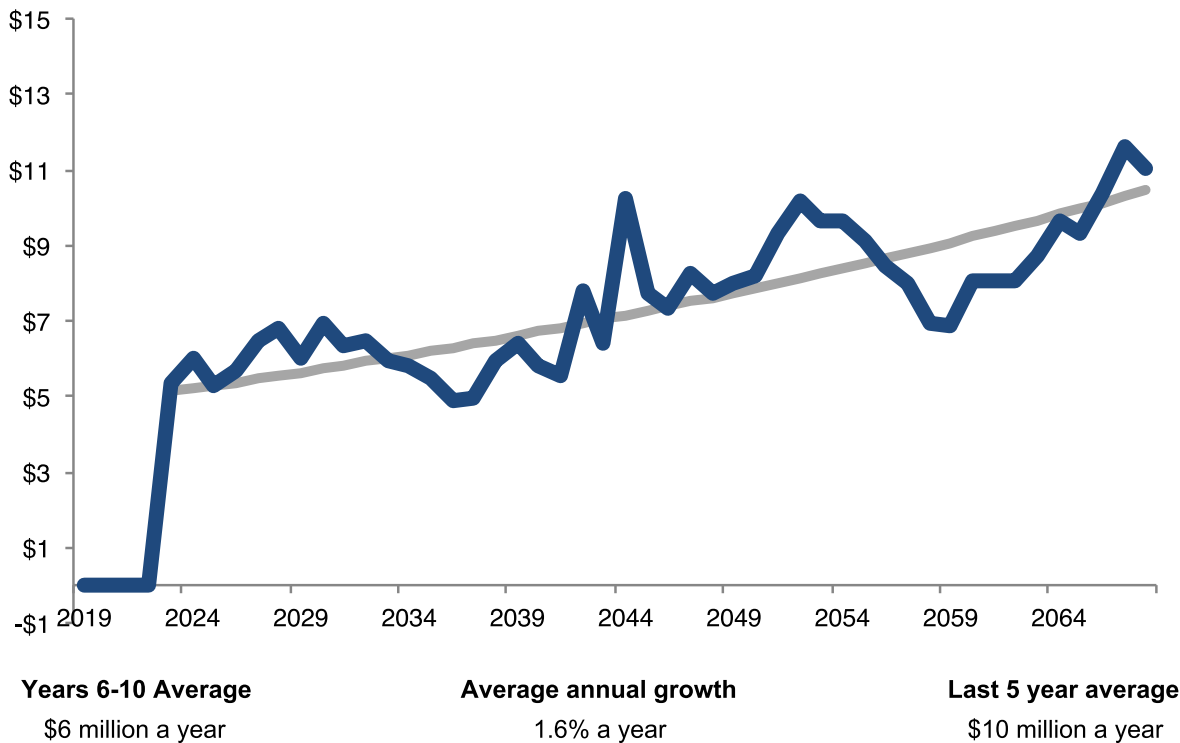| Beginning balance	Ending balance
$9.1 billion	$78.7 billion

Blue line represents median result

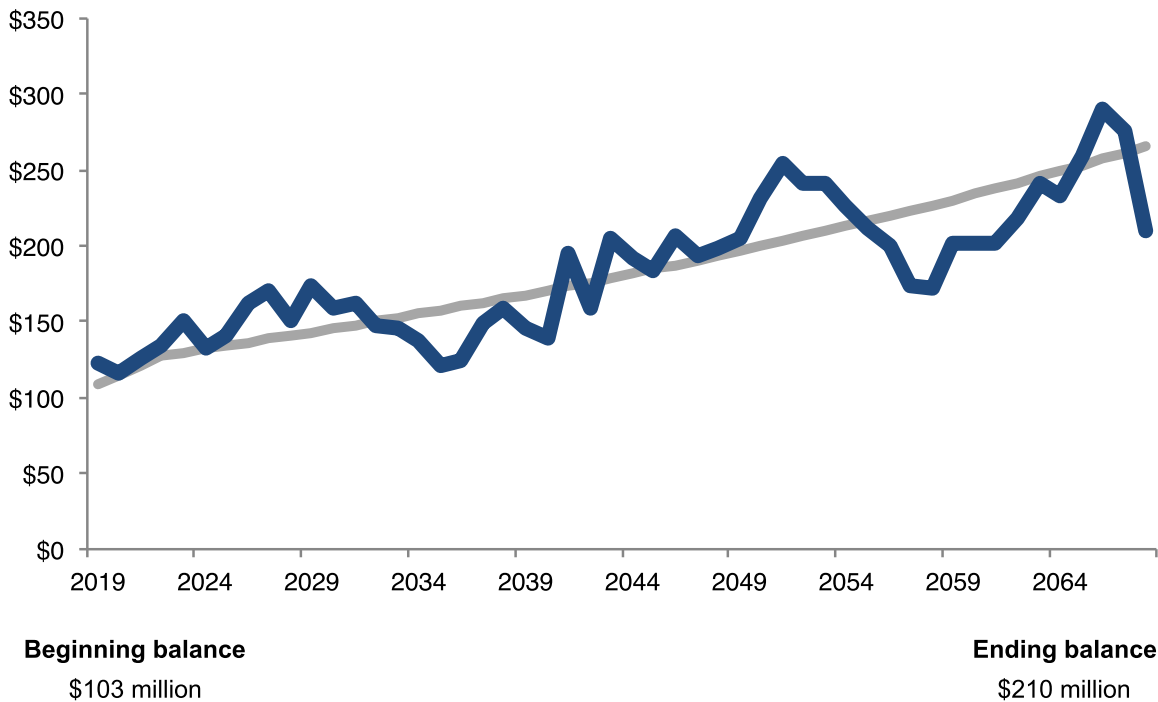Gray line represents constant returns of 10.1% a year

Oregon median result from Monte Carlo simulation

Investment return = 5.6%, standard deviation = 14.8%

Projected annual distribution ($ million)

Years 6-10 Average	Average annual growth	Last 5 year average
$6 million a year	1.6% a year	$10 million a year

Projected year-end fund balance ($ million)

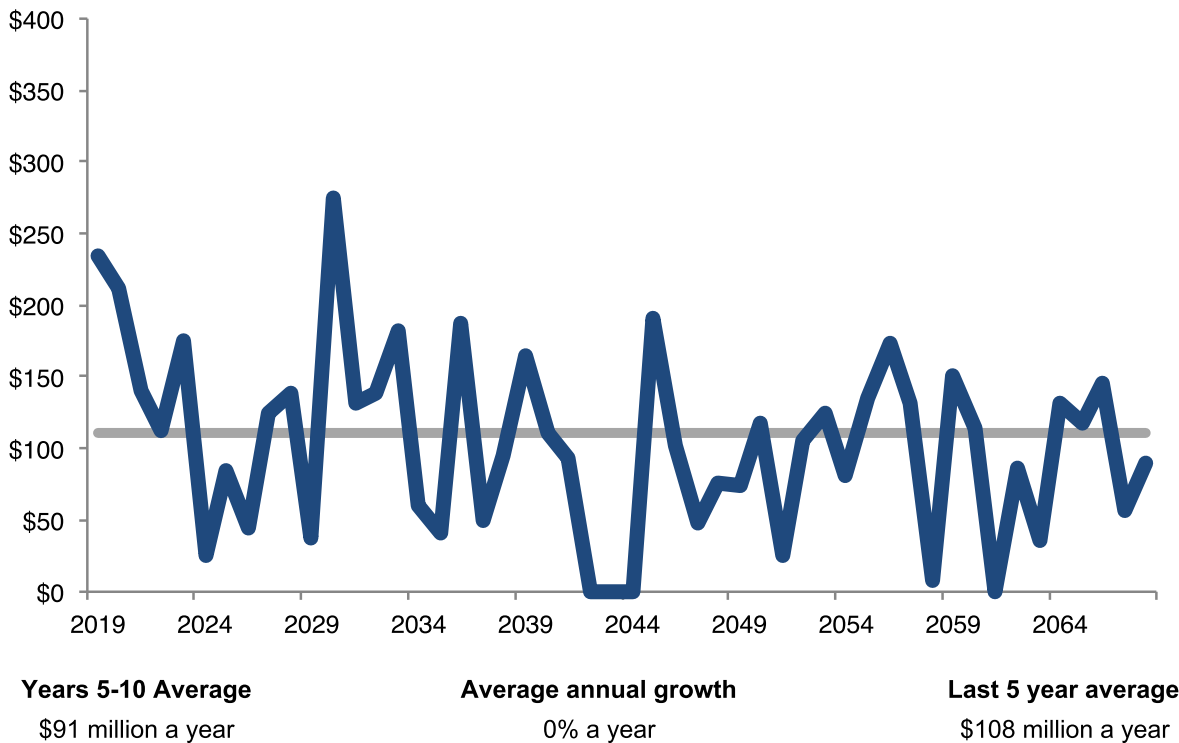| Beginning balance		Ending balance
$103 million		$210 million

Blue line represents median result

Gray line represents constant returns of 5.6% a year

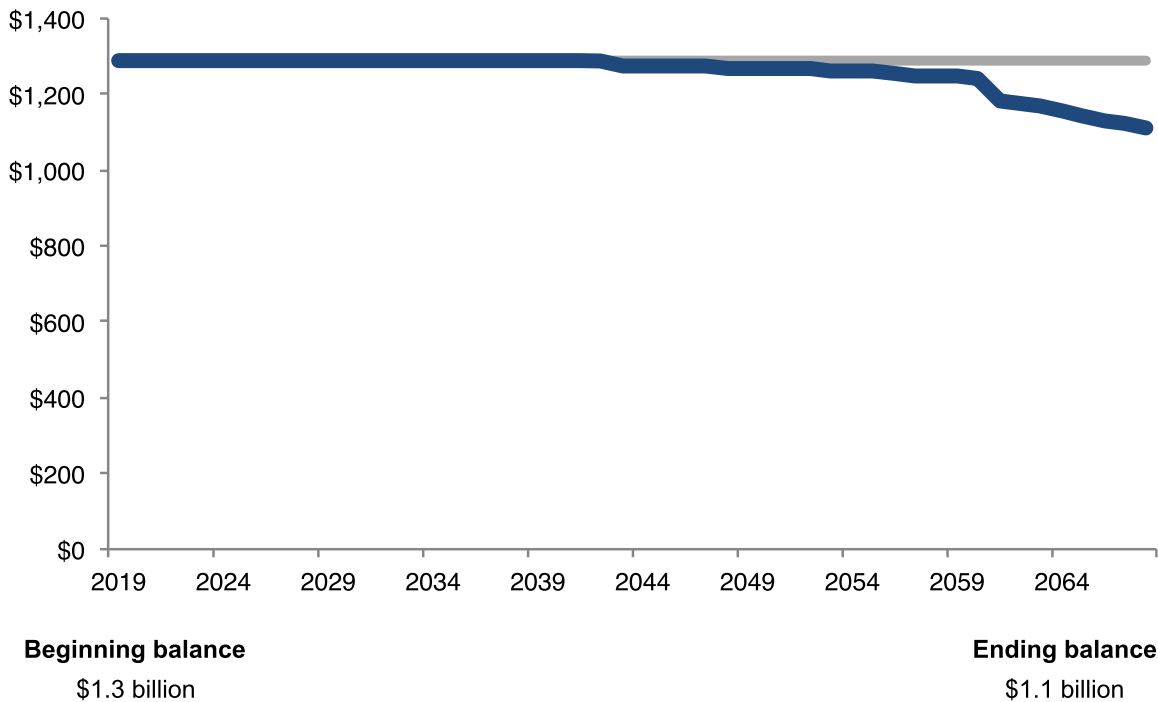## Utah median result from Monte Carlo simulation

Investment return = 8.6%, standard deviation = 7.2%

Projected annual distribution ($ million)

Years 5-10 Average	Average annual growth	Last 5 year average
$91 million a year	0% a year	$108 million a year

Projected year-end fund balance ($ million)

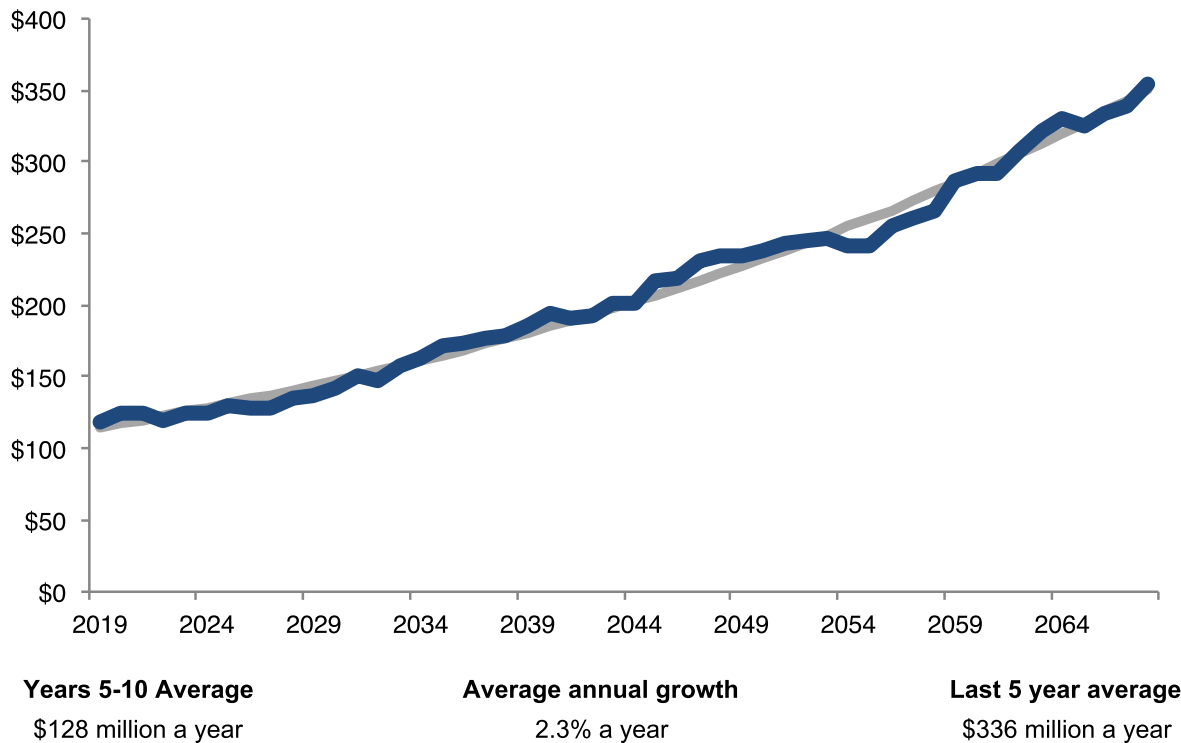| Beginning balance	Ending balance
$1.3 billion	$1.1 billion

Blue line represents median result

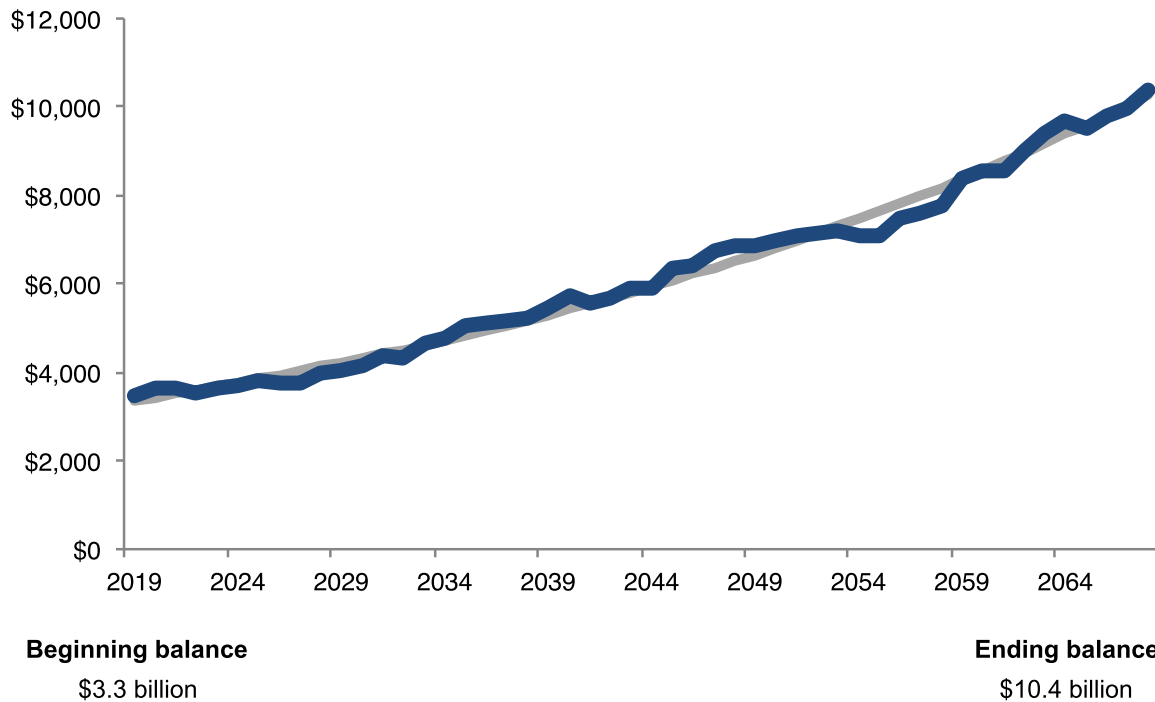Gray line represents constant returns of 8.6% a year

Washington median result from Monte Carlo simulation

Investment return = 5.8%, standard deviation = 3.2%

Projected annual distribution ($ million)

Years 5-10 Average	Average annual growth	Last 5 year average
$128 million a year	2.3% a year	$336 million a year

Projected year-end fund balance ($ million)

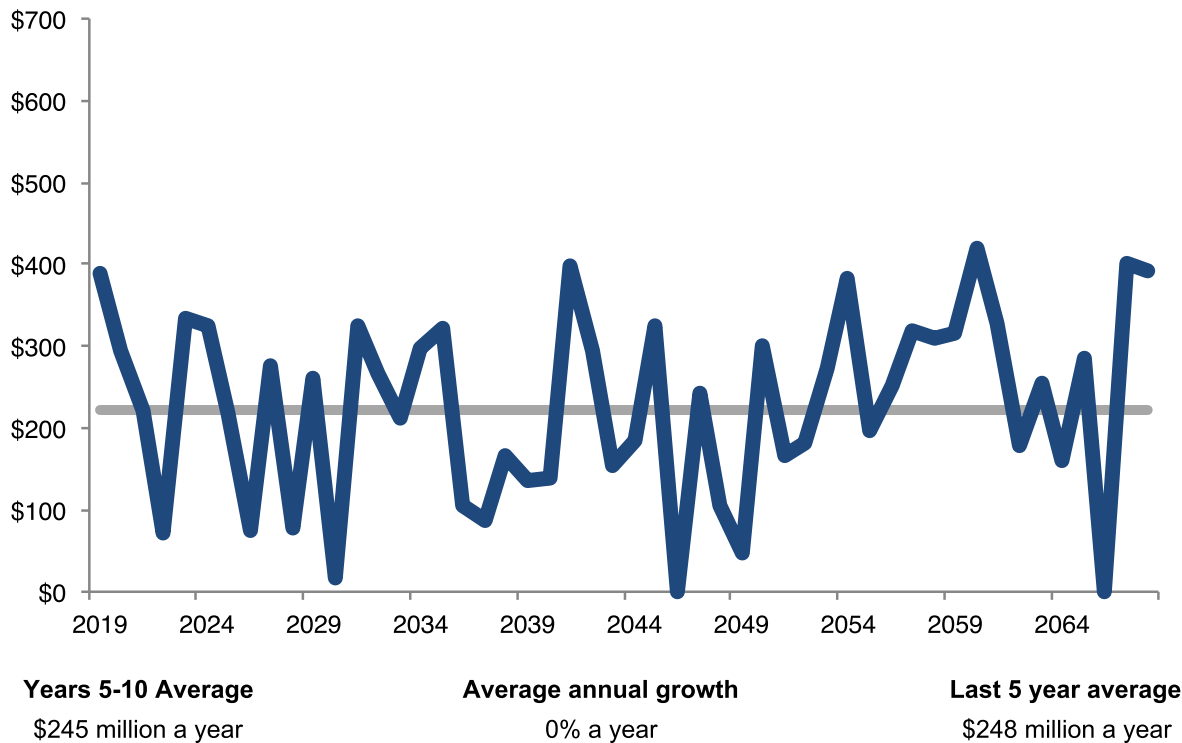| Beginning balance		Ending balance
$3.3 billion		$10.4 billion

Blue line represents median result

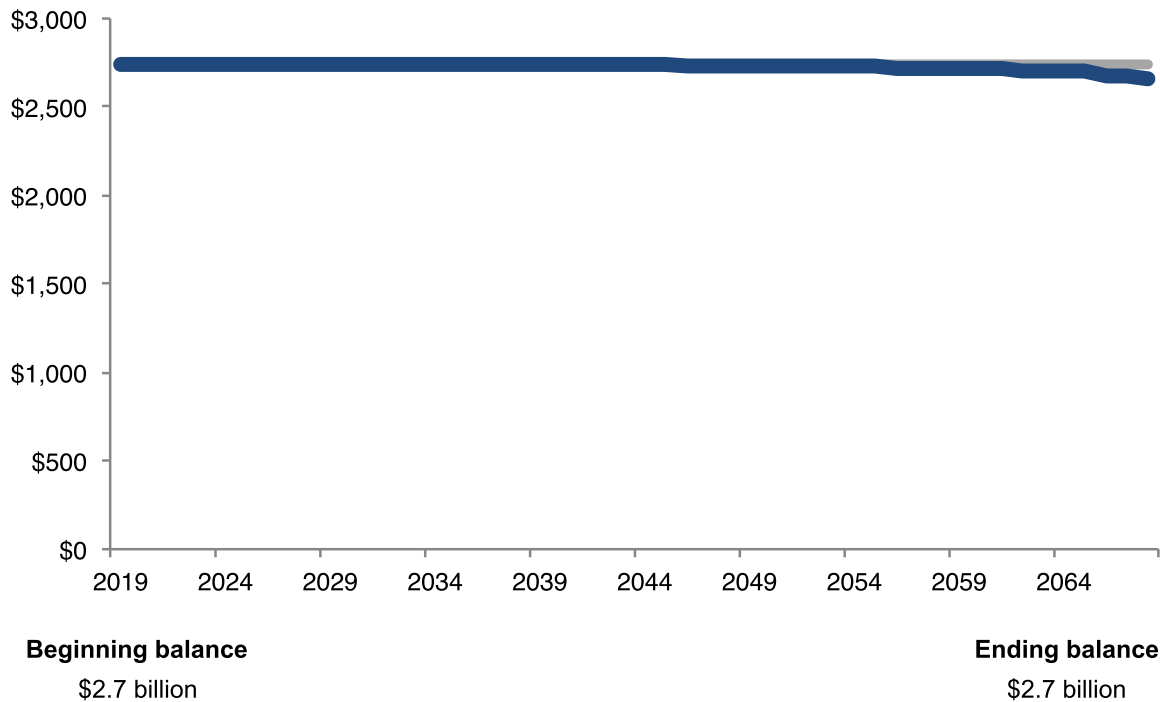Gray line represents constant returns of 5.8% a year

Wyoming median result from Monte Carlo simulation

Investment return = 8.1%, standard deviation = 6.2%

Projected annual distribution ($ million)

Years 5-10 Average	Average annual growth	Last 5 year average
$245 million a year	0% a year	$248 million a year

Projected year-end fund balance ($ million)

Beginning balance	Ending balance
$2.7 billion	$2.7 billion

Blue line represents median result

Gray line represents constant returns of 8.1% a year