Student Growth in New Hampshire on the NECAP
An Overview of Student Growth Percentiles

Damian W. Betebenner

National Center for the Improvement of Educational Assessment
Dover, NH

September 16th, 2009

Relevant Topics

- What questions can student growth percentiles be used to address?
- What are student growth percentiles and percentile growth projections/trajectories?
- What role do the results from growth percentile analyses play in accountability system determinations?
- What role do the results from growth percentile analyses play in program evaluations?

What are the relevant questions for parents?

Yen (2007), from a state survey of parents, teachers and administrators, compiled a list of frequently voiced questions/concerns by stakeholder group.

Parent Questions

- Did my child make a year's worth of progress in a year?
- Is my child growing appropriately toward meeting state standards?
- Is my child growing as much in Math as Reading?
- Did my child grow as much this year as last year?

What are the relevant questions for teachers?

Yen (2007), from a state survey of parents, teachers and administrators, compiled a list of frequently voiced questions/concerns by stakeholder group.

Teacher Questions

- Did my students make a year's worth of progress in a year?
- Did my students grow appropriately toward meeting state standards?
- How close are my students to becoming Proficient?
- Are there students with unusually low growth who need special attention?

What are the relevant questions for administrators?

Yen (2007), from a state survey of parents, teachers and administrators, compiled a list of frequently voiced questions/concerns by stakeholder group.

Administrator Questions

- Did the students in our district/school make a year's worth of progress in all content areas?
- Are our students growing appropriately toward meeting state standards?
- Does this school/program show as much growth as that one?
- Can I measure student growth even for students who do not change proficiency categories?
- Can I pool together results from different grades to draw summary conclusions?

Descriptive Questions

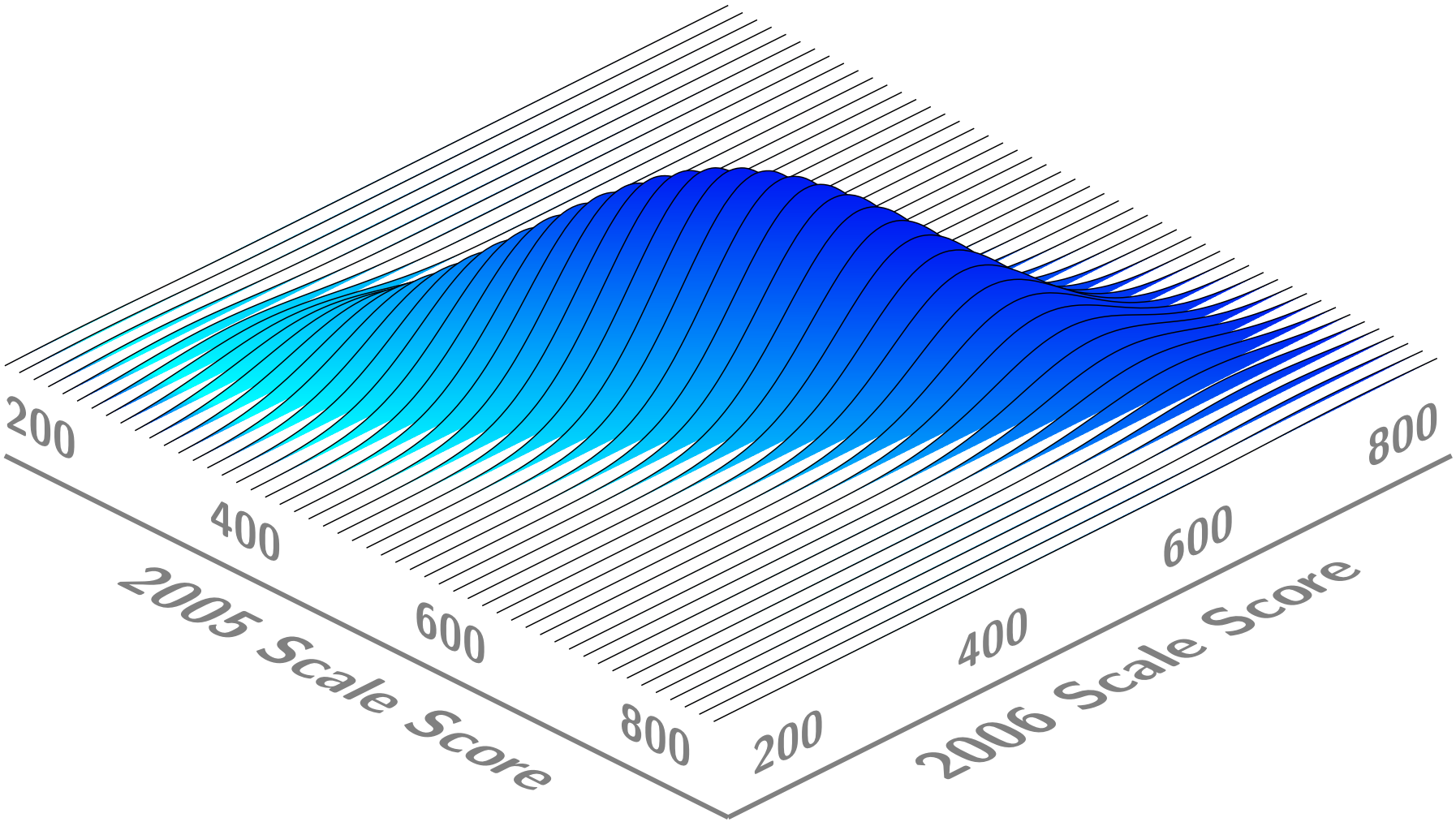
- Note that the questions put forward by stakeholders are primarily descriptive
- The questions are only peripherally associated with causality.
- High stakes accountability has transformed questions about student growth into questions about responsibility/cause: Teacher and School Effectiveness.
- Again, starting with descriptive questions, perhaps the place to begin is with description and a model supporting such ends.

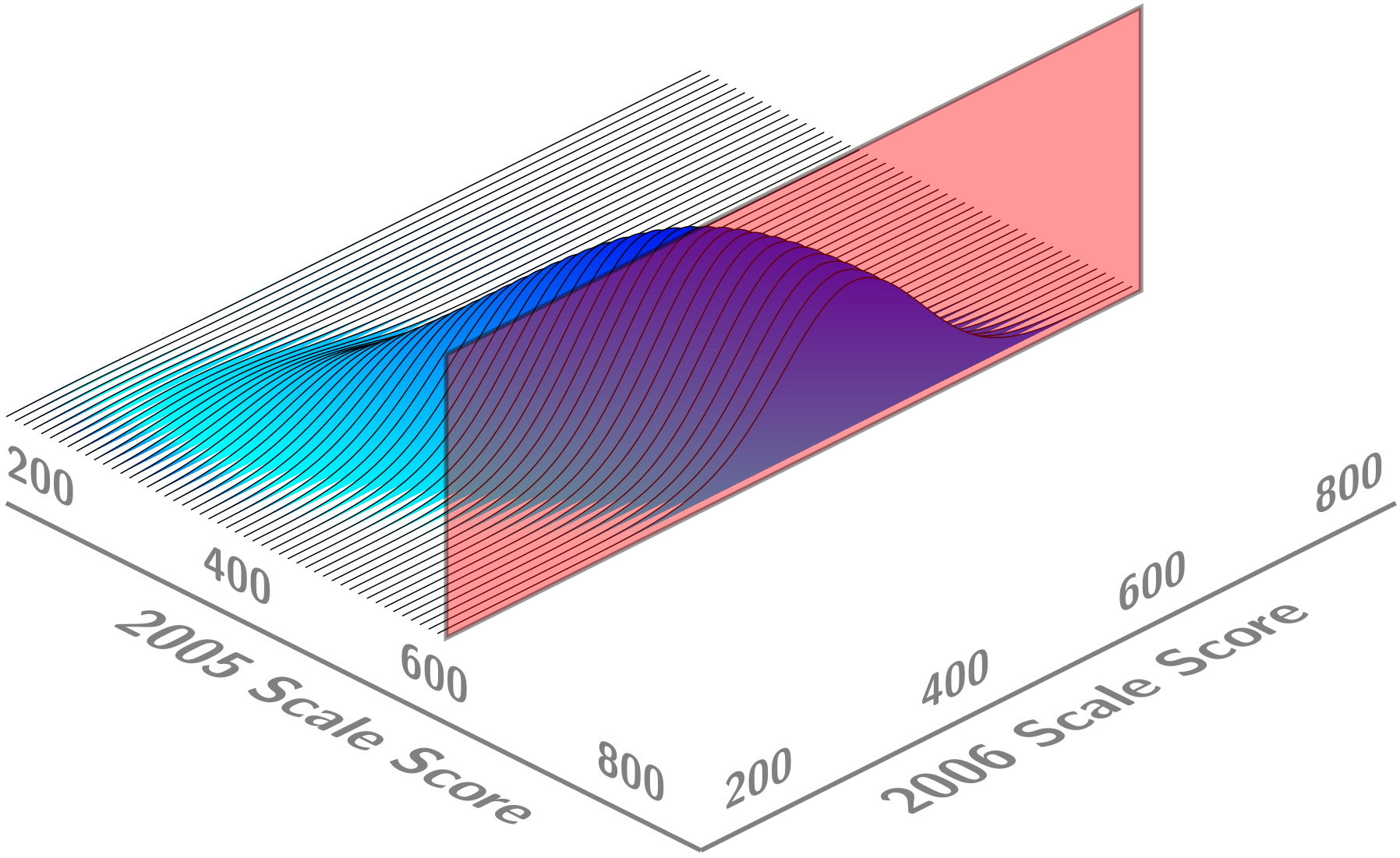
Descriptive Accountability

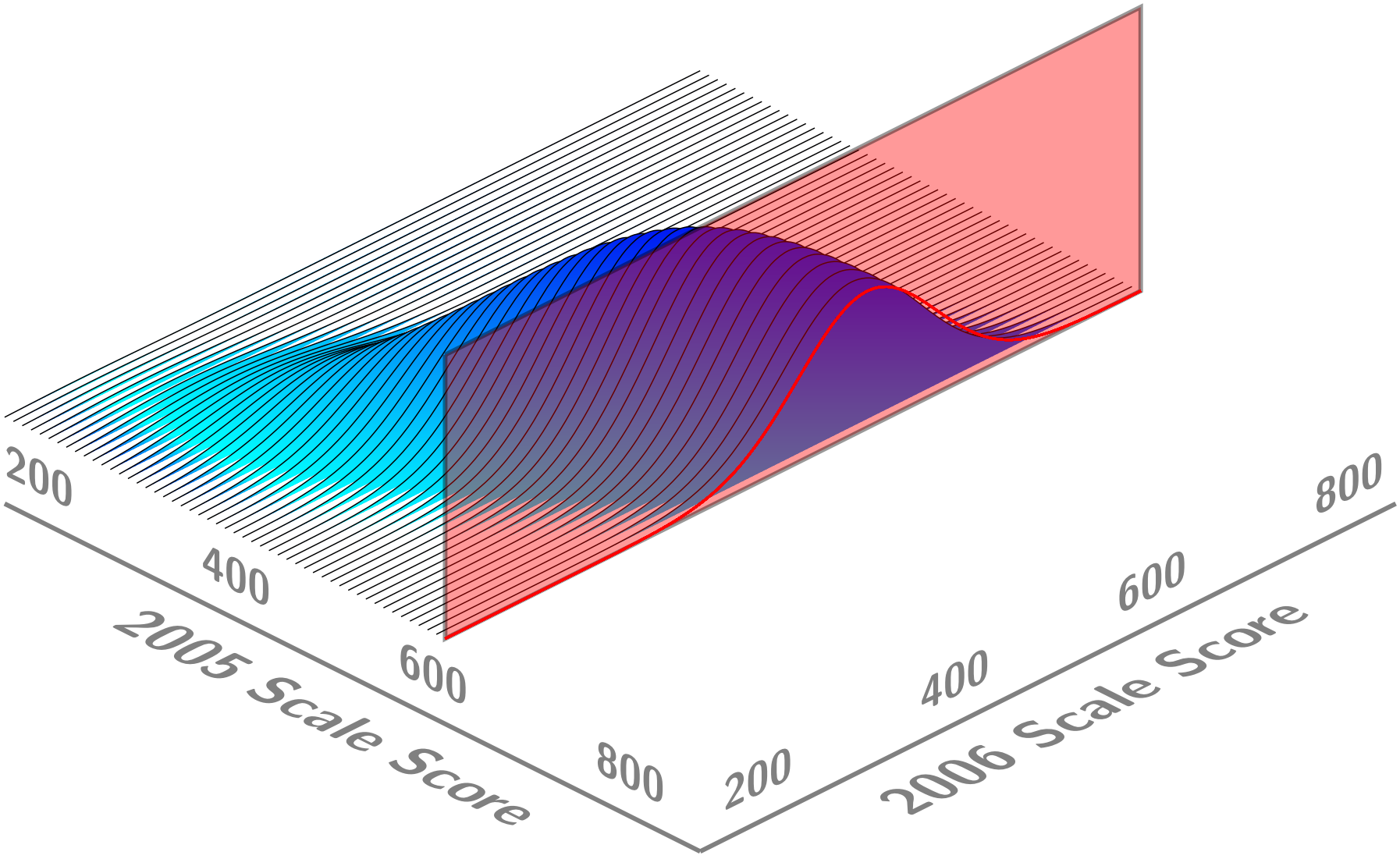
Accountability system results can have value without making causal inferences about school quality, solely from the results of student achievement measures and demographic characteristics. Treating the results as descriptive information and for identification of schools that require more intensive investigation of organizational and instructional process characteristics are potentially of considerable value. Rather than using the results of the accountability system as the sole determiner of sanctions for schools, they could be used to flag schools that need more intensive investigation to reach sound conclusions about needed improvements or judgments about quality [Linn, 2008, p. 21].

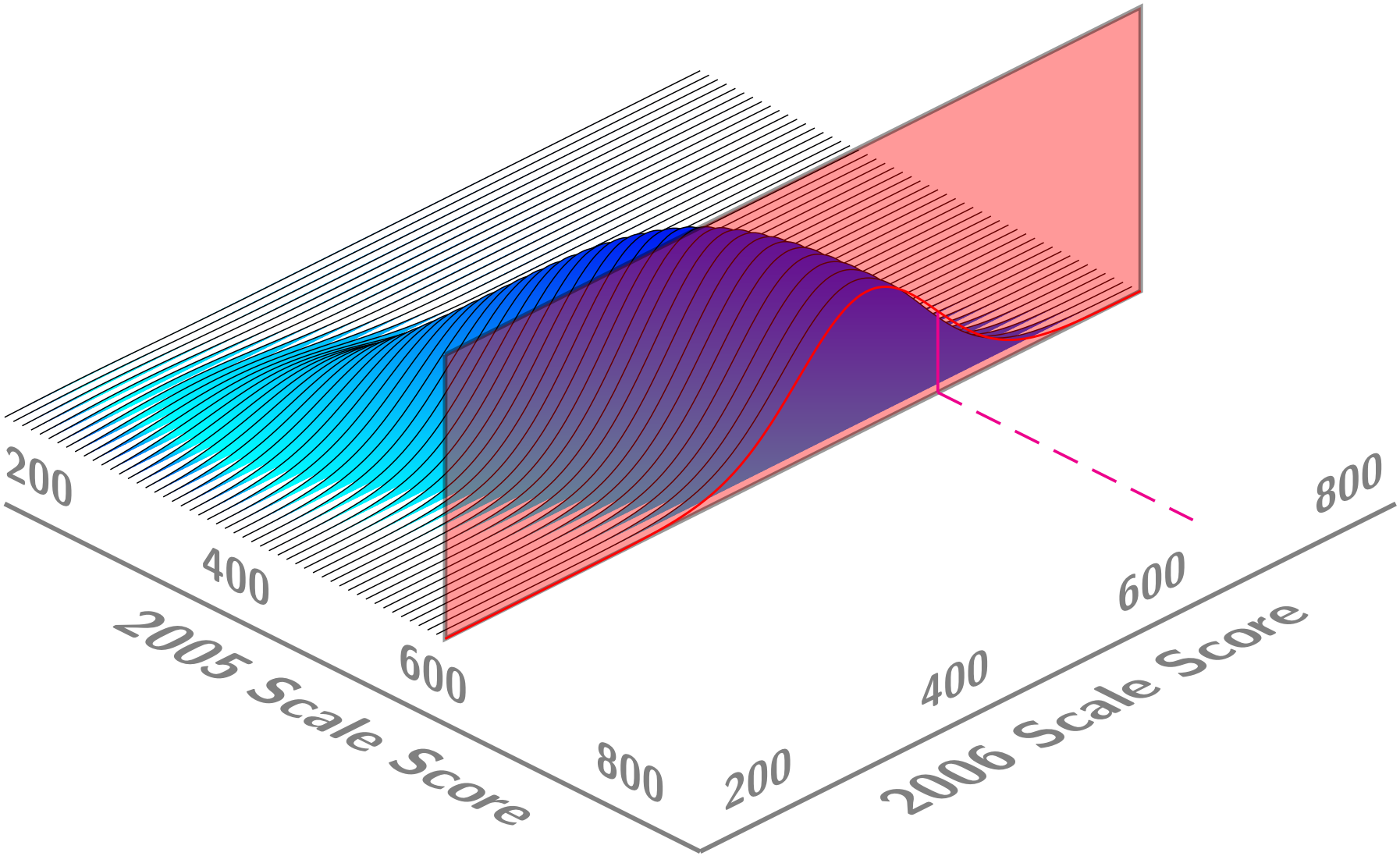
Describing Student Growth

- Measuring student growth, even with a vertical scale, is not a simple task.
- Some believe a vertical scale simplifies the task of measuring student growth.
- Even with an interval (or ratio) scale, growth is not easy to interpret. Consider, for example, height.
  - A child might grow 4 inches between ages 3 and 4.
  - 4 inches is a well understood quantity.
  - The 4 inch increase becomes really meaningful only when understood alongside the growth of other 3 to 4 year olds.
- Student growth percentiles were developed to provide a normative context for describing student growth.


200
400
600
800
2005 Scale Score
200
400
600
800
2006 Scale Score


200
400
600
800
2005 Scale Score
200
400
600
800
2006 Scale Score


200
400
600
800
2005 Scale Score
200
400
600
800
2006 Scale Score


200
400
600
800
2005 Scale Score
200
400
600
800
2006 Scale Score

Student Growth Percentiles

Should we be surprised with a child's current achievement given their prior achievement?

- Given a student's prior scale scores and the associated conditional density, their current scale score corresponds to a percentile of that conditional distribution.
- This percentile is the student's growth percentile.
- Growth percentiles are closely related to estimating the probability of observing a student's current achievement taking account of their past achievement:

$$\Pr(\textit{Current Achievement}|\textit{Past Achievement}).$$

- As such, growth percentiles describe the rarity of a student's current achievement conditional upon their prior achievement.

Student Growth Percentiles

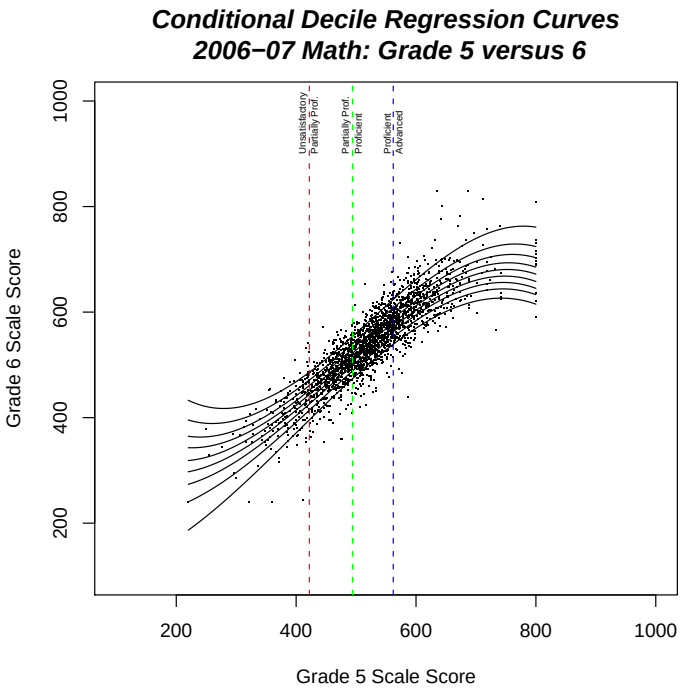
Should we be surprised with a child's current achievement given their prior achievement?

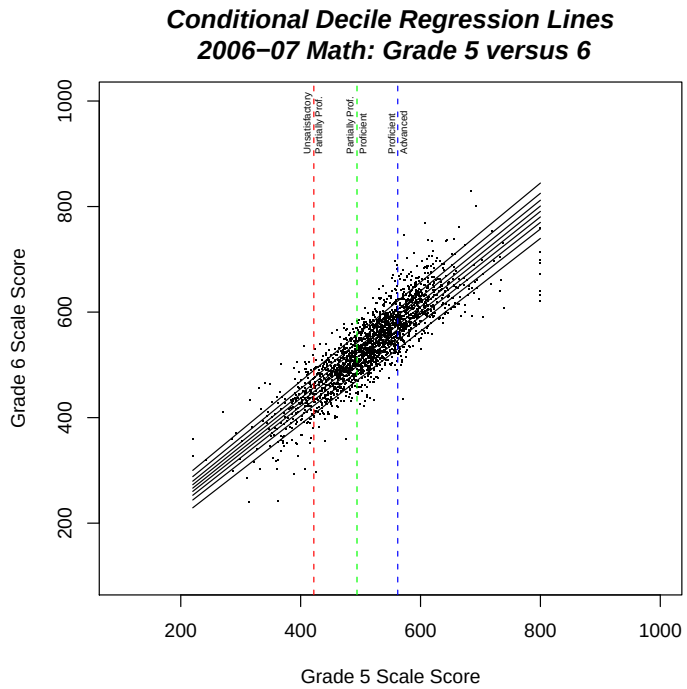
- Student growth percentiles answer this question.
- Consider a low achieving student with 90th percentile growth and a high achieving student with 10th percentile growth.
  - The low achieving student grew at a rate exceeding 90 percent of similar students.
  - The high achieving student grew at a rate exceeding just 10 percent of similar students.
  - The low achiever's growth is more *exemplary* (probabilistically) than the high achiever's.
- Judgments about the adequacy of student growth require external criteria.

Model for Student Growth Percentiles

- Student growth percentiles are calculated using quantile regression with B-spline smoothing, a generalized additive model.
- Quantile regression is used to model the complete distribution of the response variable (current achievement)
- B-spline smoothing is uses to accommodate non-linearity and heteroscedasticity of the data.
- The model/method is descriptive and all about data fit—it's a data mining procedure.
- The model quantifies $\textit{distance} = \textit{rate} \cdot \textit{time}$ probabilistically.

Model for Student Growth Percentiles





Description, Inference, and Causality

Richard Berk in *Regression Analysis, A Constructive Critique* (2003) provides an account of the (ab)use of regression

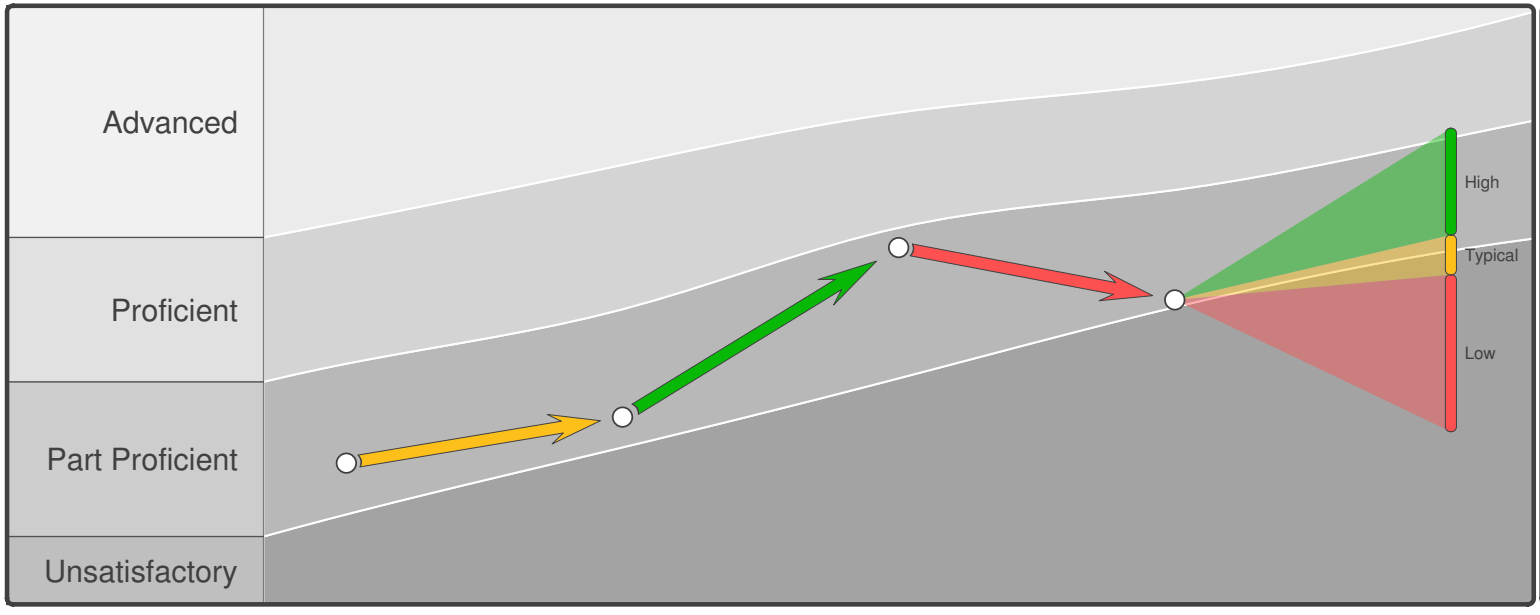
Three Cheers for Description Descriptive models are judged by their utility

Two Cheers for Inference Inferential models are judged based upon their ability to fulfill statistical criteria associated with generalizing from a sample to a population. What is the chance process?

One Cheer for Causality Causal models are judged, in addition to inferential issues, by an external theory which plausibly relates causes/interventions and effects/outcomes.

Combining Normative and Criterion-Referenced Growth

- Growth adequacy is determined by whether a student's growth is sufficient to reach/maintain desired achievement levels (e.g., proficiency).
- Percentile growth projections/trajectories are calculated for each student using the most recent historical NECAP longitudinal student growth analyses.
- These "growth-to-standard" trajectories indicate what it will take for the student to reach/maintain proficiency and other achievement levels.
- This approach to quantifying "adequate" growth (done by Colorado) was approved by the USED for use in AYP determinations as part of the Growth Model Pilot Program.



Math

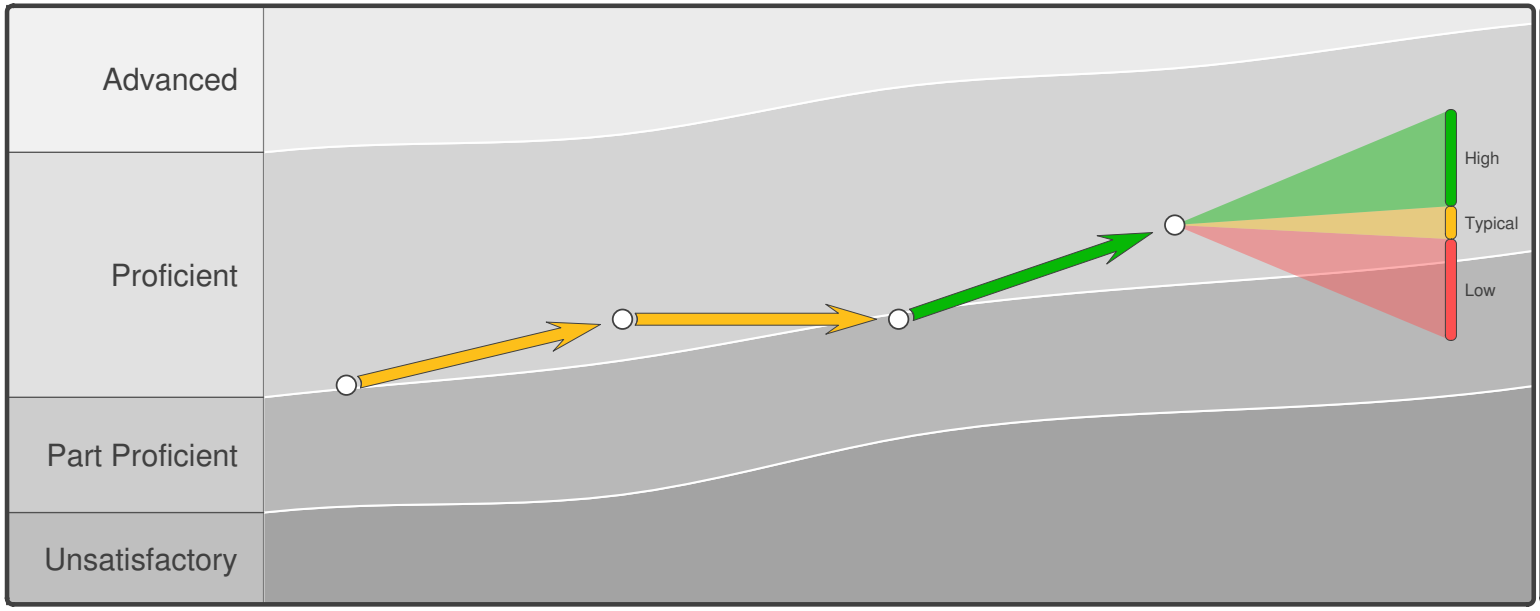
Achievement

CSAP Math Scale Score

Growth

Level	Percentiles
High	66th – 99th
Typical	36th – 65th
Low	1st – 35th

	Grade 5 2005	Grade 6 2006	Grade 7 2007	Grade 8 2008	Next Year	
Scale Score Achievement Level	446 Part Proficient	468 Part Proficient	549 Part Proficient	524 Proficient		Achievement
Growth Percentile Growth Level		52 Typical	96 High	25 Low		Growth



Reading

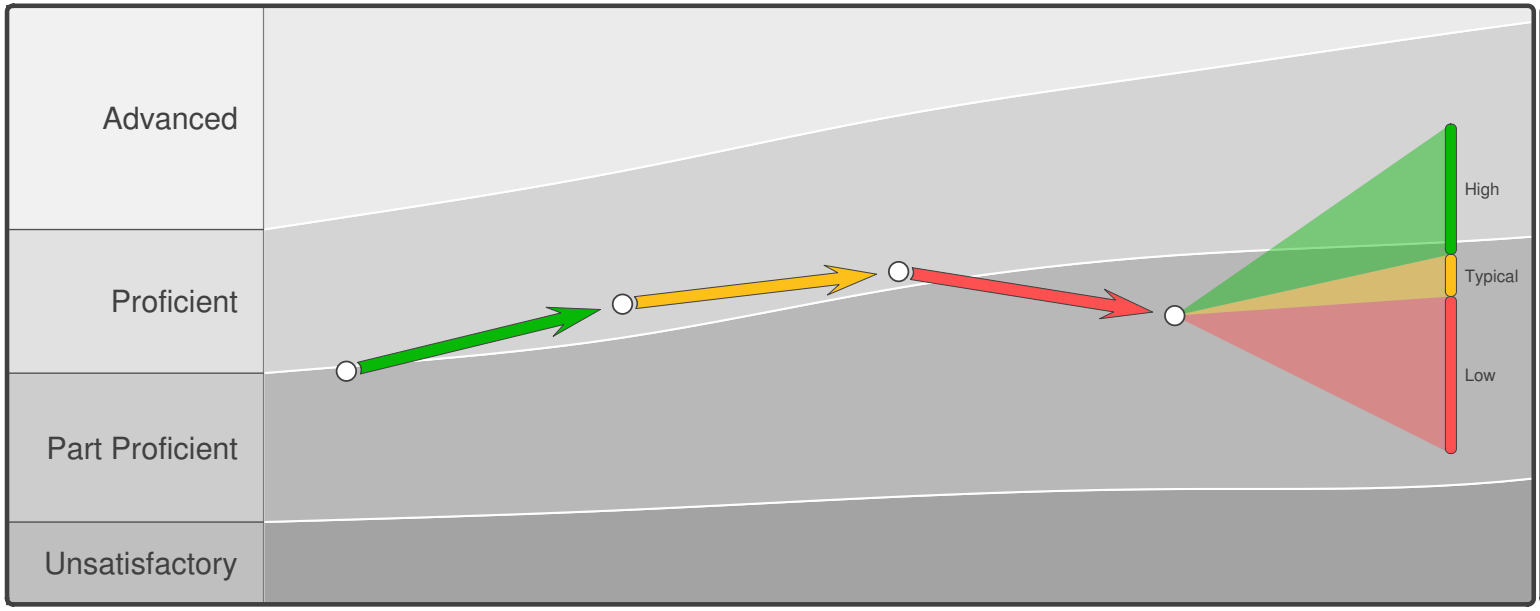
Achievement

CSAP Reading Scale Score

Growth

Level	Percentiles
High	66th – 99th
Typical	36th – 65th
Low	1st – 35th

	Grade 5 2005	Grade 6 2006	Grade 7 2007	Grade 8 2008	Next Year	
Scale Score	589	617	617	657		Achievement
Achievement Level	Proficient	Proficient	Part Proficient	Proficient		
Growth Percentile		64	36	83		Growth
Growth Level		Typical	Typical	High		



Writing

Achievement

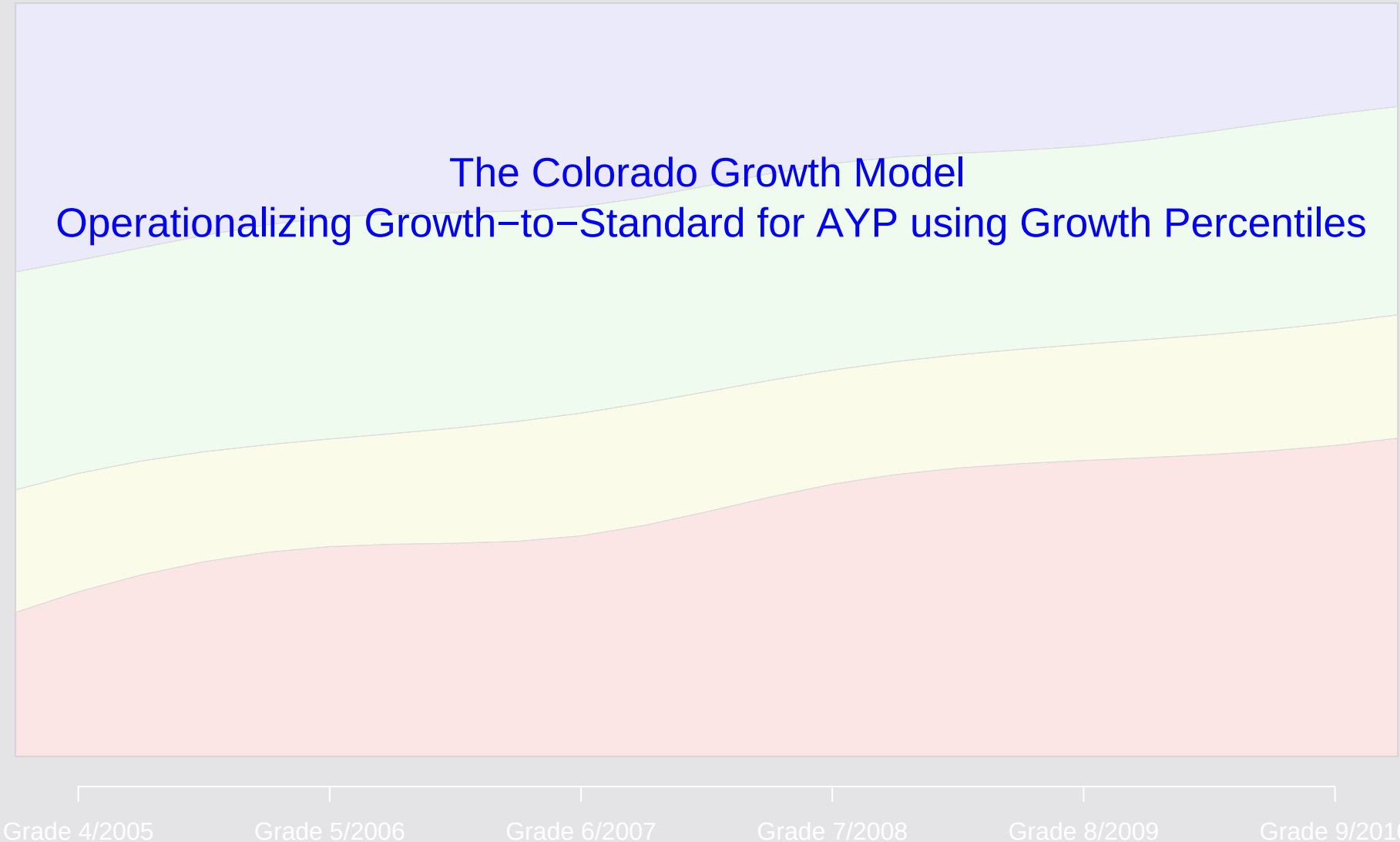
CSAP Writing Scale Score

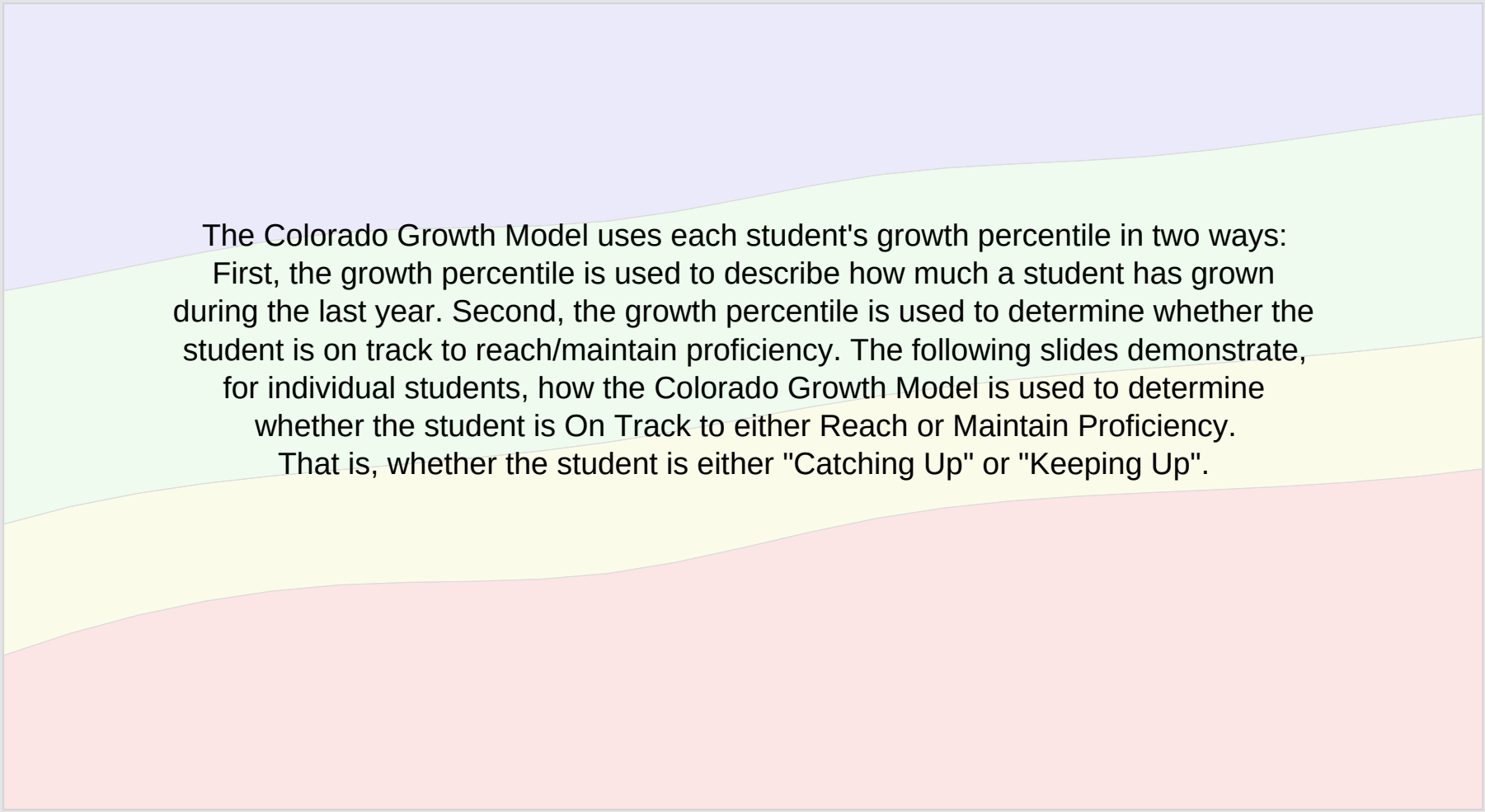
Growth

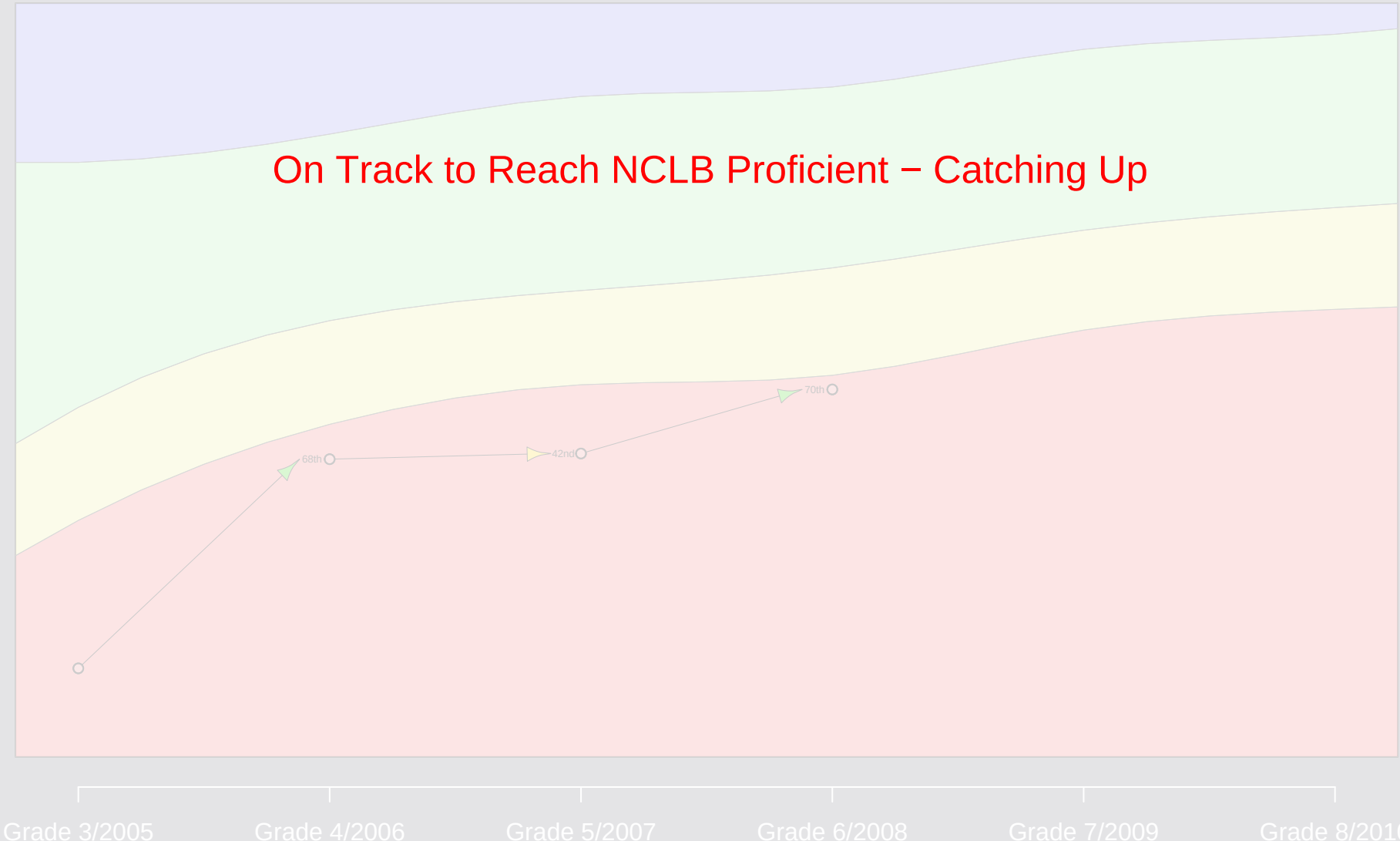
Level	Percentiles
High	66th – 99th
Typical	36th – 65th
Low	1st – 35th

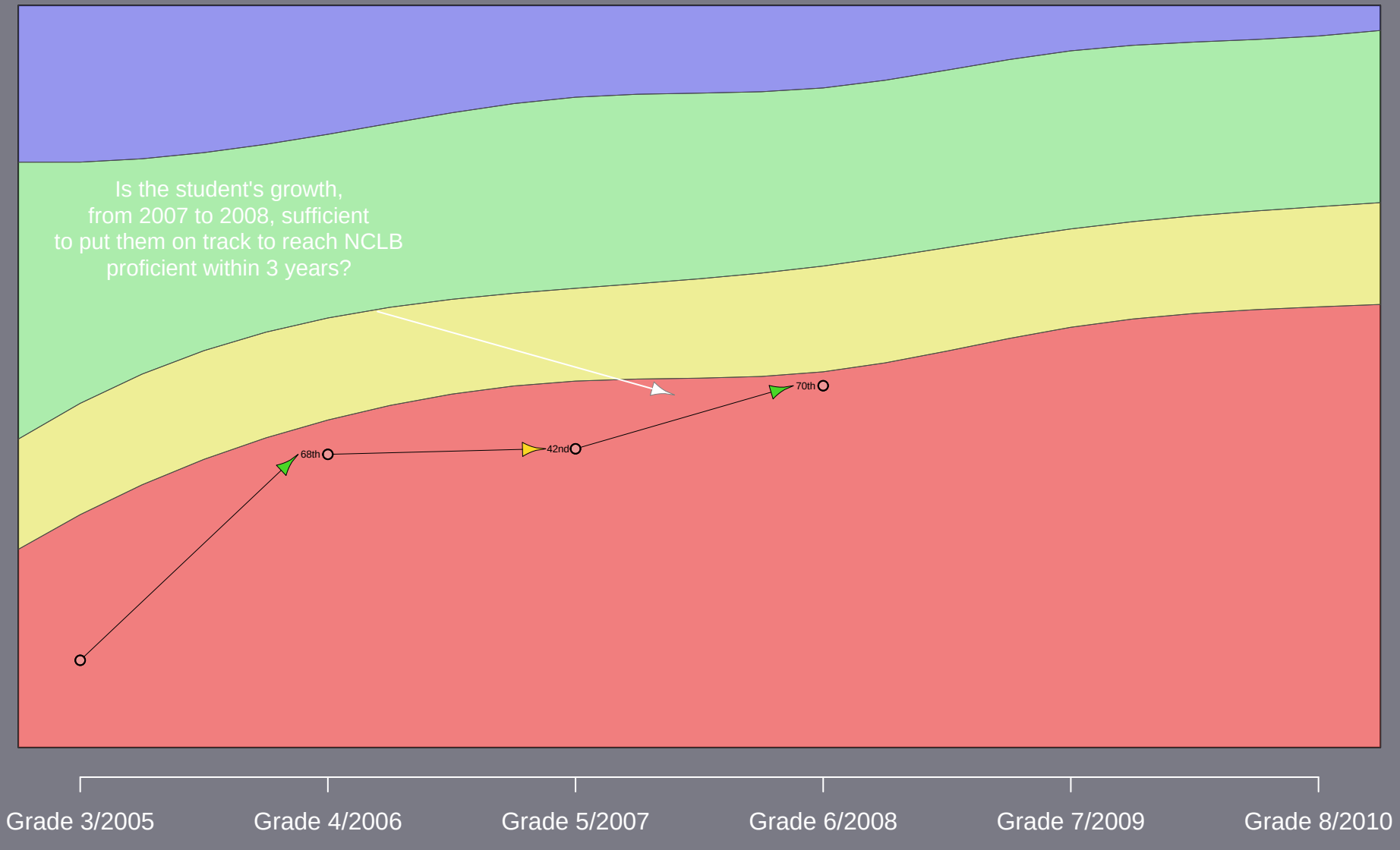
	Grade 5 2005	Grade 6 2006	Grade 7 2007	Grade 8 2008	Next Year	
Scale Score Achievement Level	495 Part Proficient	530 Proficient	547 Proficient	524 Part Proficient		Achievement
Growth Percentile Growth Level		81 High	50 Typical	16 Low		Growth

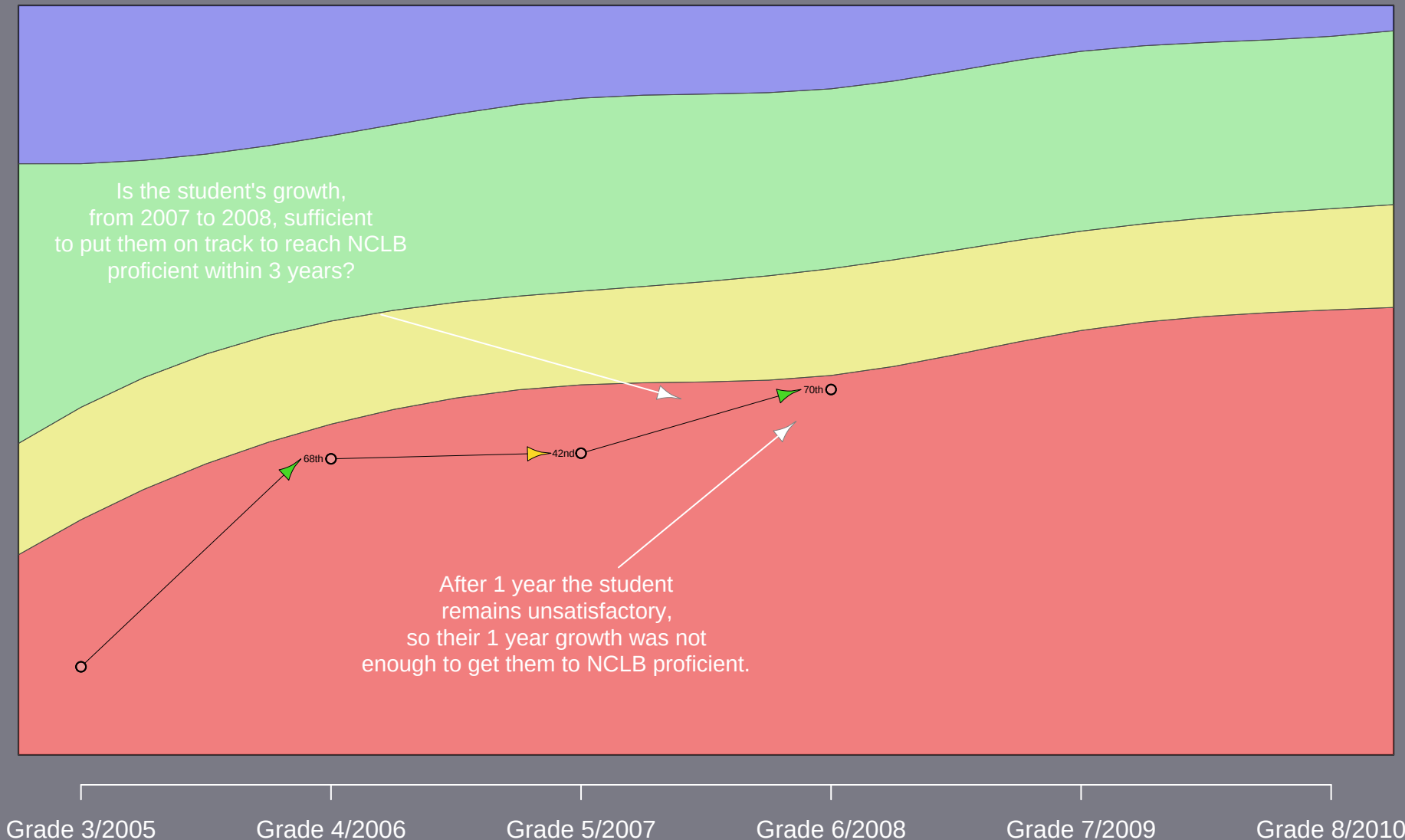
The Colorado Growth Model
Operationalizing Growth−to−Standard for AYP using Growth Percentiles

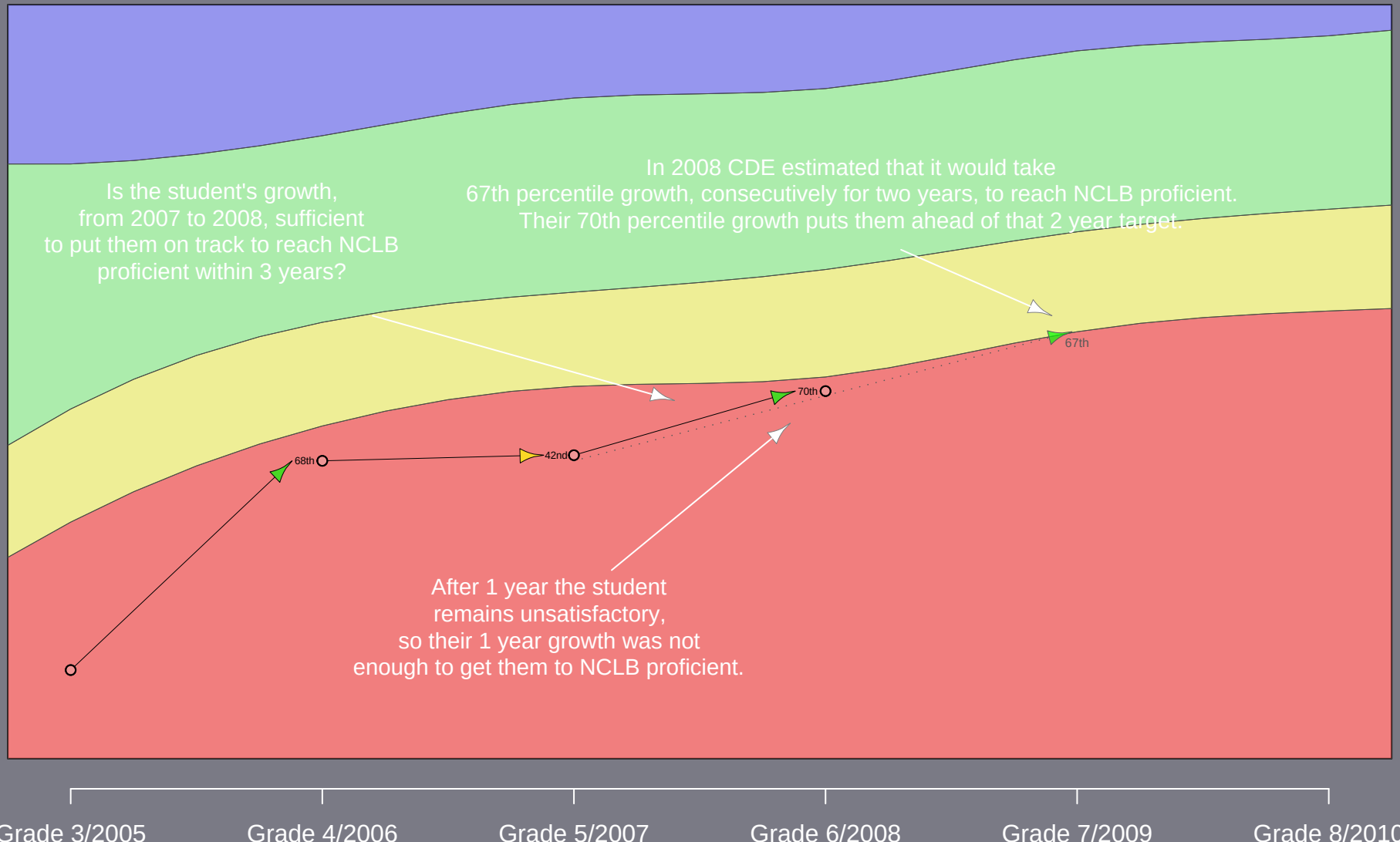


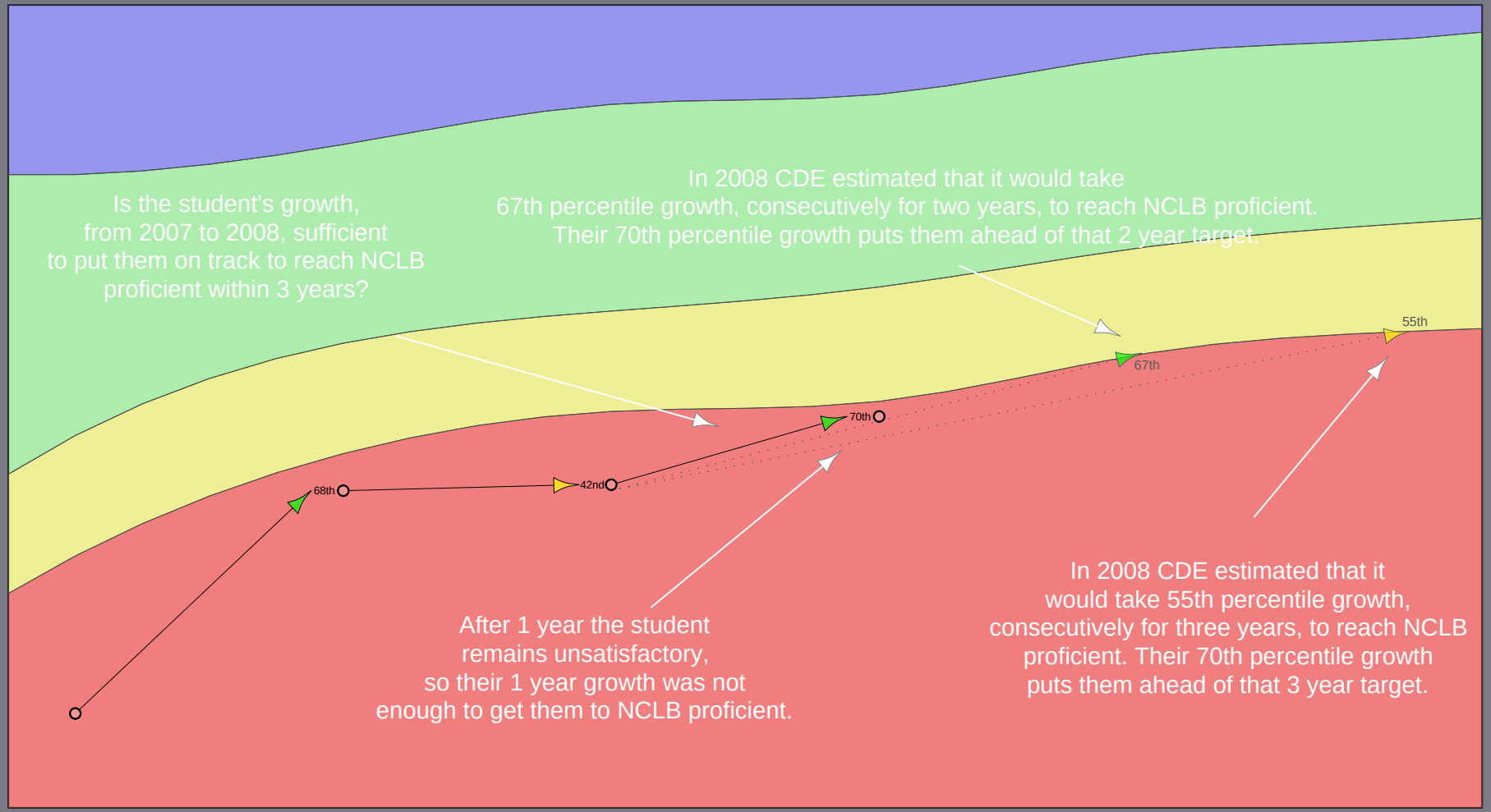

The Colorado Growth Model uses each student's growth percentile in two ways: First, the growth percentile is used to describe how much a student has grown during the last year. Second, the growth percentile is used to determine whether the student is on track to reach/maintain proficiency. The following slides demonstrate, for individual students, how the Colorado Growth Model is used to determine whether the student is On Track to either Reach or Maintain Proficiency. That is, whether the student is either "Catching Up" or "Keeping Up".
Grade 4/2005
Grade 5/2006
Grade 6/2007
Grade 7/2008
Grade 8/2009
Grade 9/2010

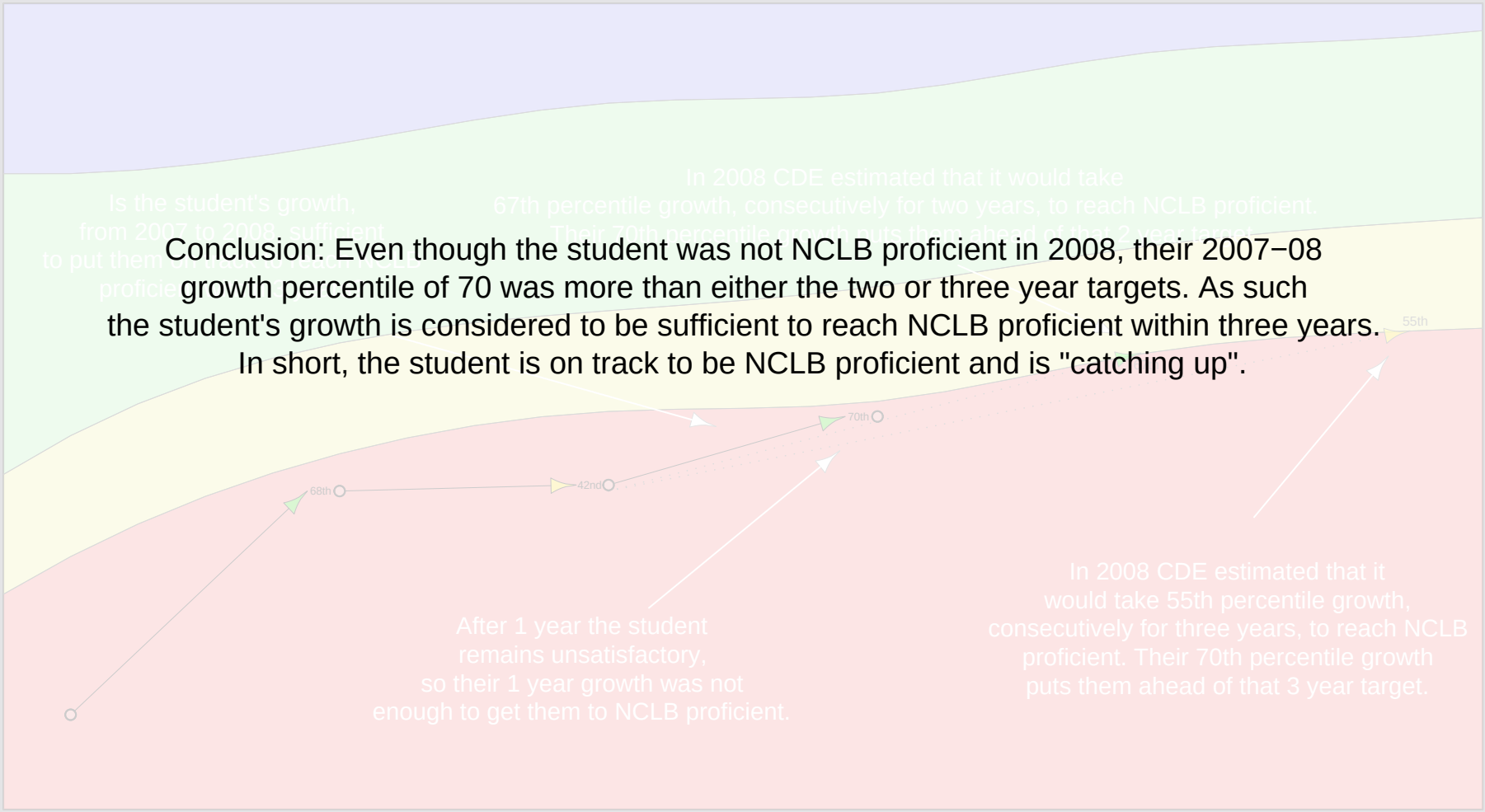

On Track to Reach NCLB Proficient − Catching Up
68th
42nd
70th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

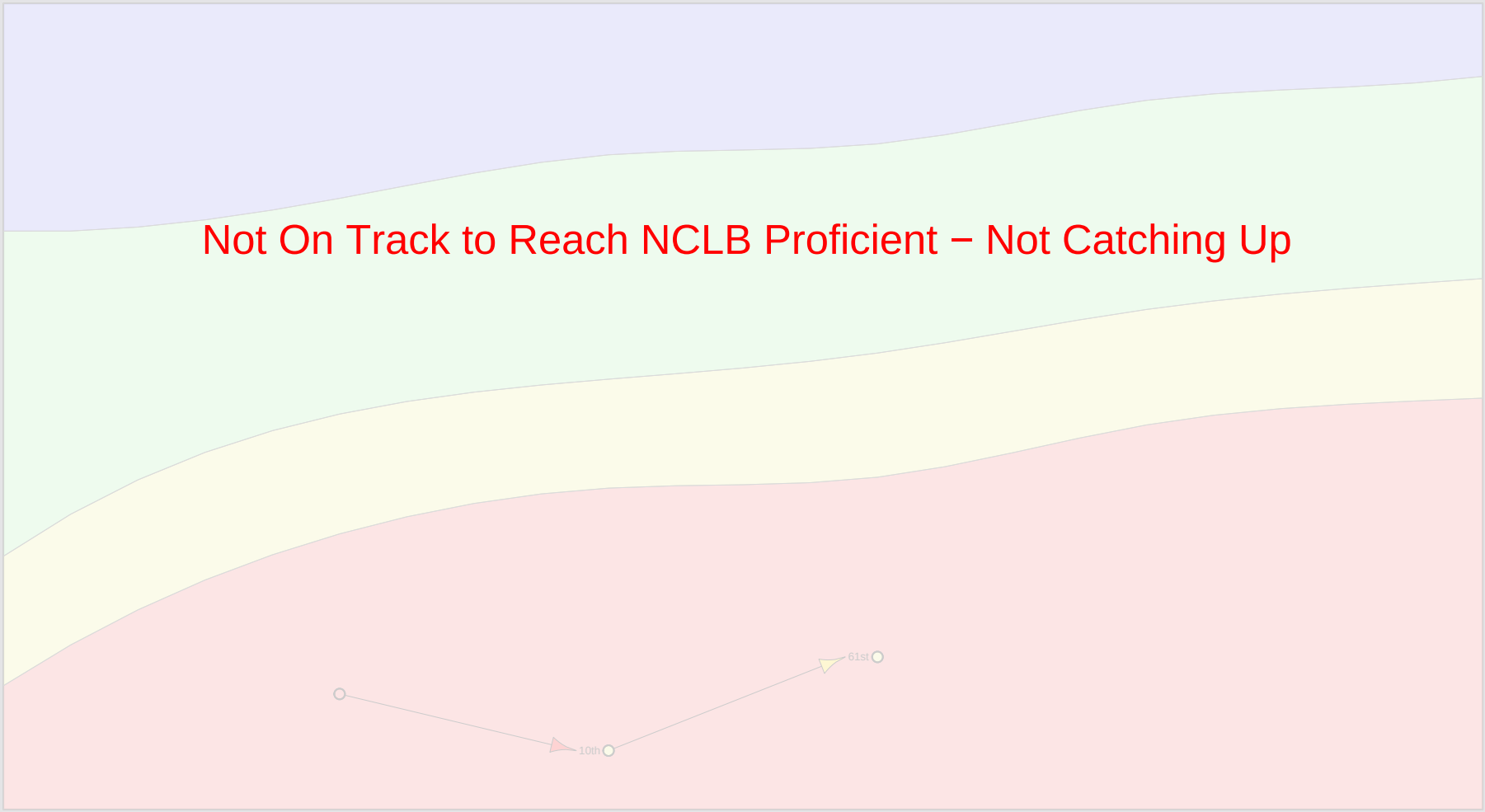

Is the student's growth,
from 2007 to 2008, sufficient
to put them on track to reach NCLB
proficient within 3 years?
68th
42nd
70th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

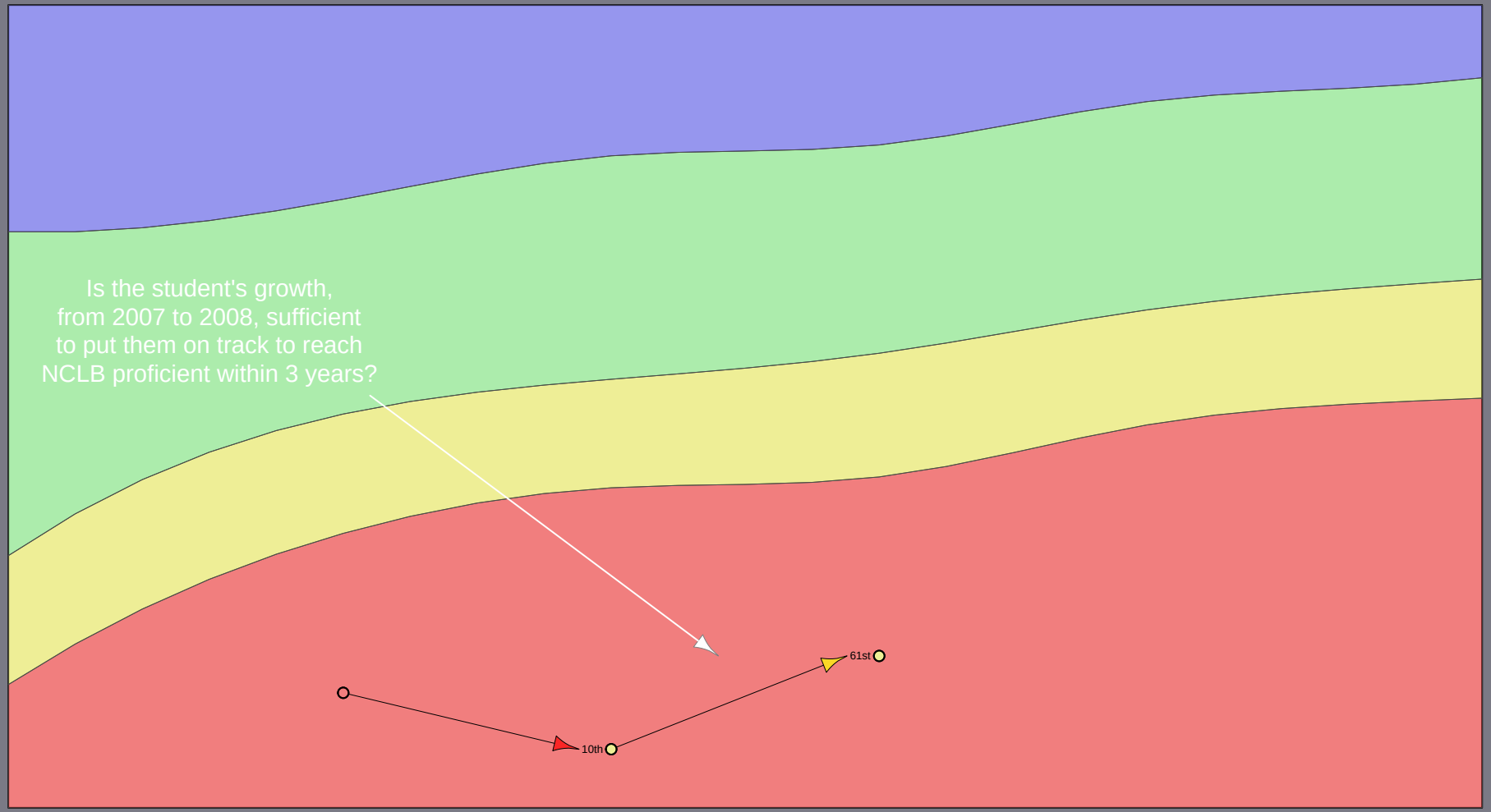

Is the student's growth,
from 2007 to 2008, sufficient
to put them on track to reach NCLB
proficient within 3 years?
68th
42nd
70th
After 1 year the student
remains unsatisfactory,
so their 1 year growth was not
enough to get them to NCLB proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

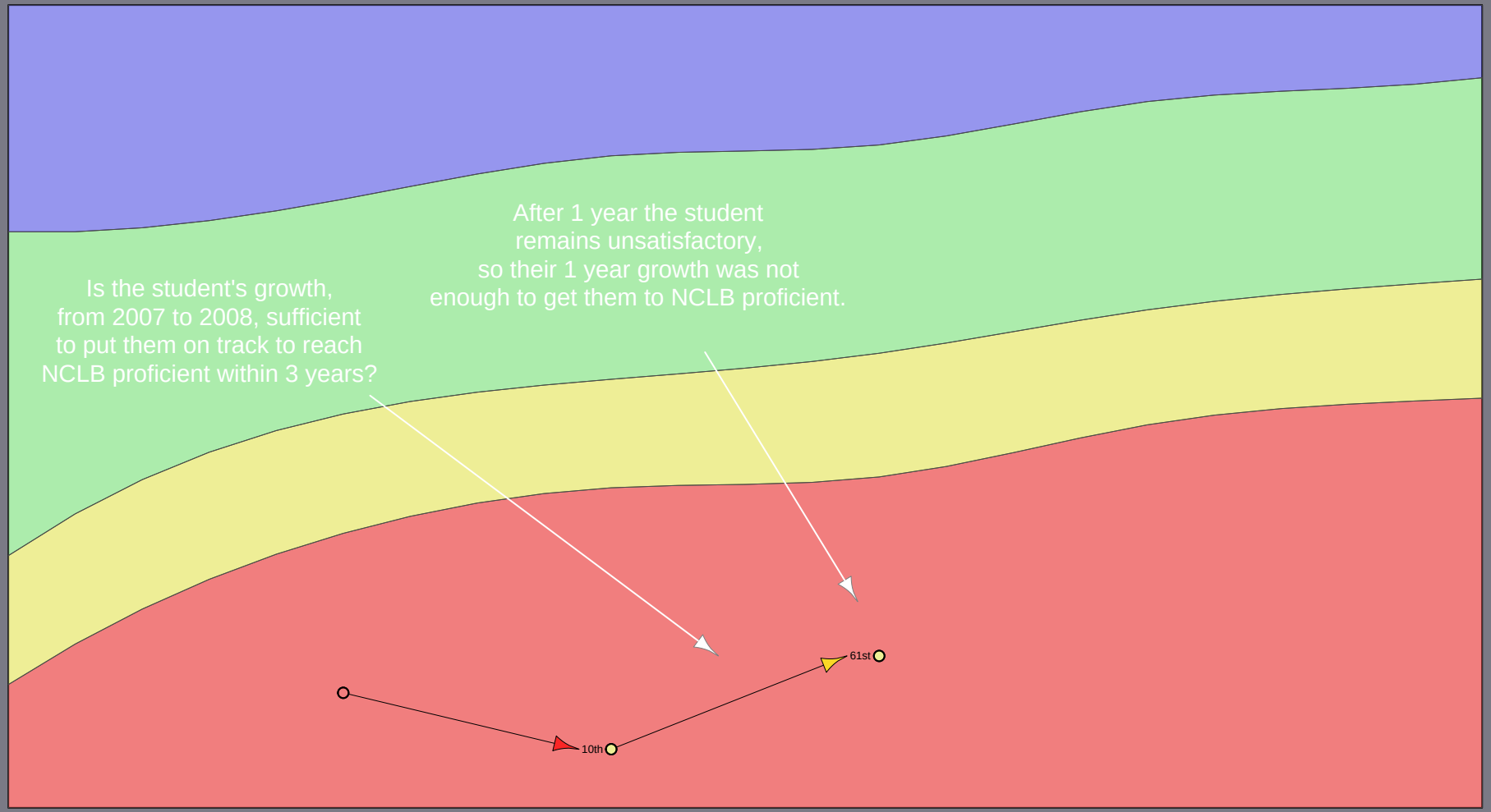

Is the student's growth,
from 2007 to 2008, sufficient
to put them on track to reach NCLB
proficient within 3 years?
In 2008 CDE estimated that it would take
67th percentile growth, consecutively for two years, to reach NCLB proficient.
Their 70th percentile growth puts them ahead of that 2 year target.
67th
70th
68th
42nd
After 1 year the student
remains unsatisfactory,
so their 1 year growth was not
enough to get them to NCLB proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

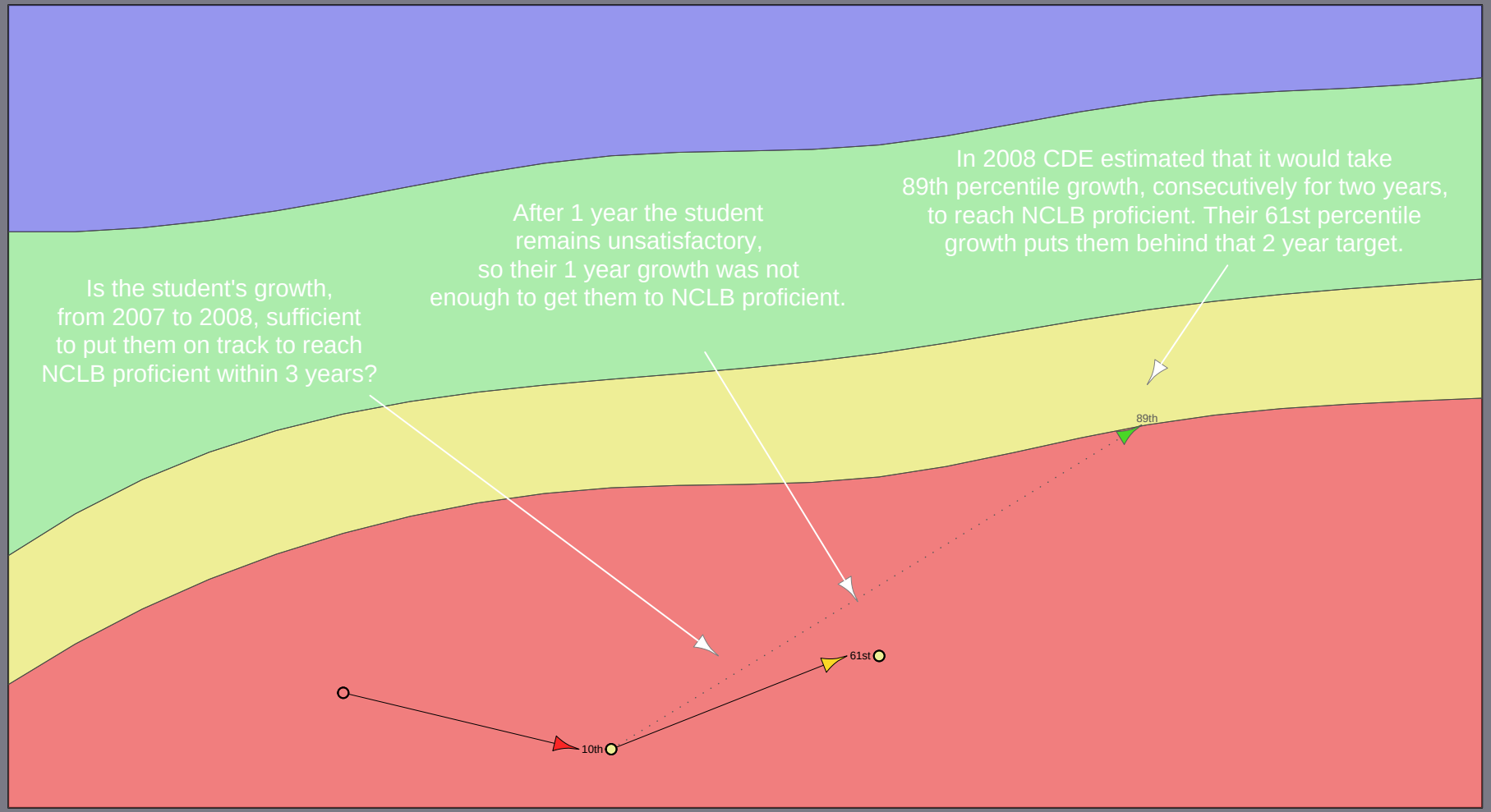

Is the student's growth,
from 2007 to 2008, sufficient
to put them on track to reach NCLB
proficient within 3 years?
In 2008 CDE estimated that it would take
67th percentile growth, consecutively for two years, to reach NCLB proficient.
Their 70th percentile growth puts them ahead of that 2 year target.
55th
67th
70th
68th
42nd
After 1 year the student
remains unsatisfactory,
so their 1 year growth was not
enough to get them to NCLB proficient.
In 2008 CDE estimated that it
would take 55th percentile growth,
consecutively for three years, to reach NCLB
proficient. Their 70th percentile growth
puts them ahead of that 3 year target.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

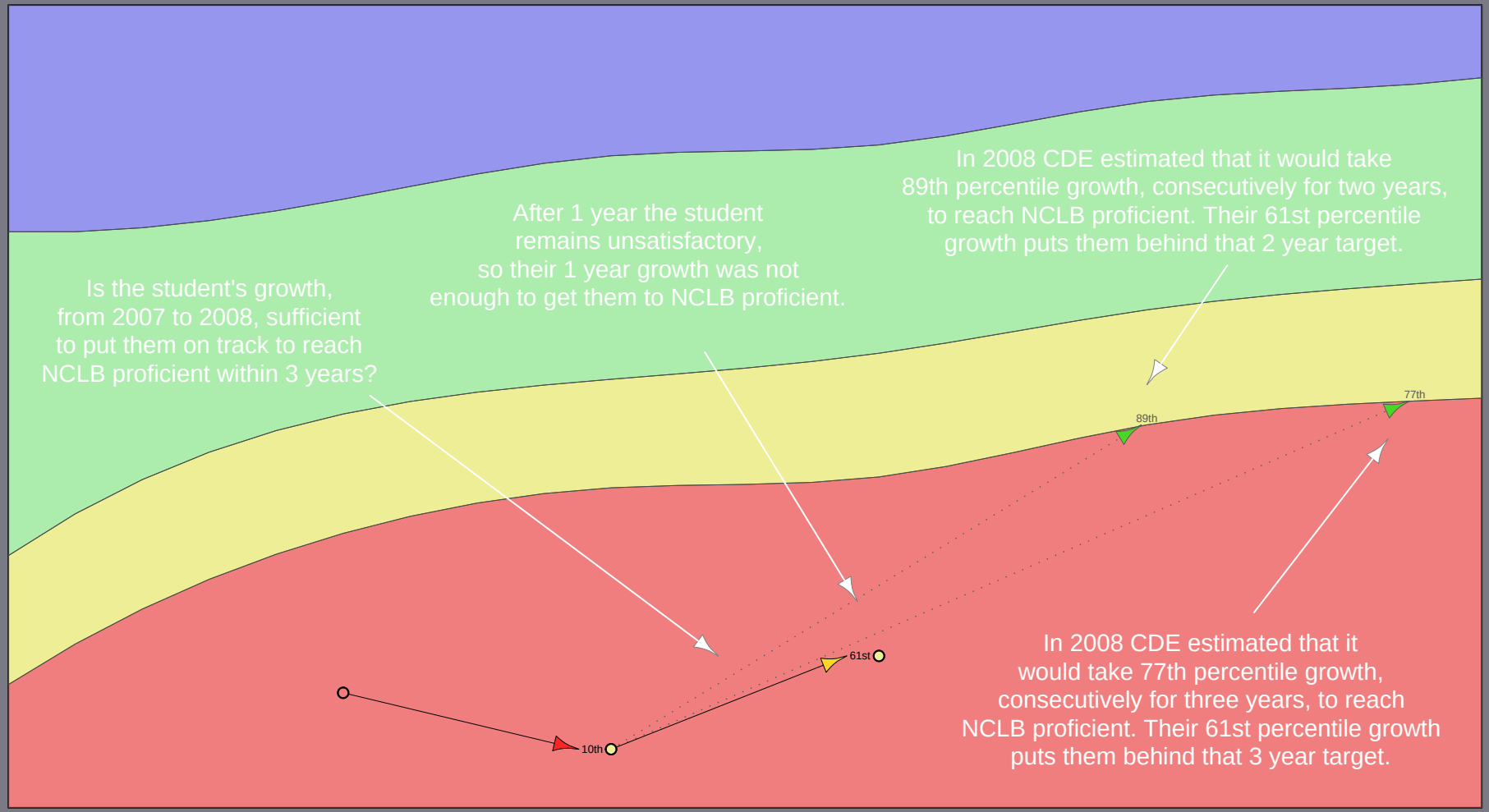

Is the student's growth,
from 2007 to 2008, sufficient
to put them on track to reach NCLB
proficiency within three years?
In 2008 CDE estimated that it would take
67th percentile growth, consecutively for two years, to reach NCLB proficient.
Their 70th percentile growth puts them ahead of that 2 year target.
Conclusion: Even though the student was not NCLB proficient in 2008, their 2007−08 growth percentile of 70 was more than either the two or three year targets. As such the student's growth is considered to be sufficient to reach NCLB proficient within three years. In short, the student is on track to be NCLB proficient and is "catching up".
68th
42nd
70th
55th
After 1 year the student
remains unsatisfactory,
so their 1 year growth was not
enough to get them to NCLB proficient.
In 2008 CDE estimated that it
would take 55th percentile growth,
consecutively for three years, to reach NCLB
proficient. Their 70th percentile growth
puts them ahead of that 3 year target.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

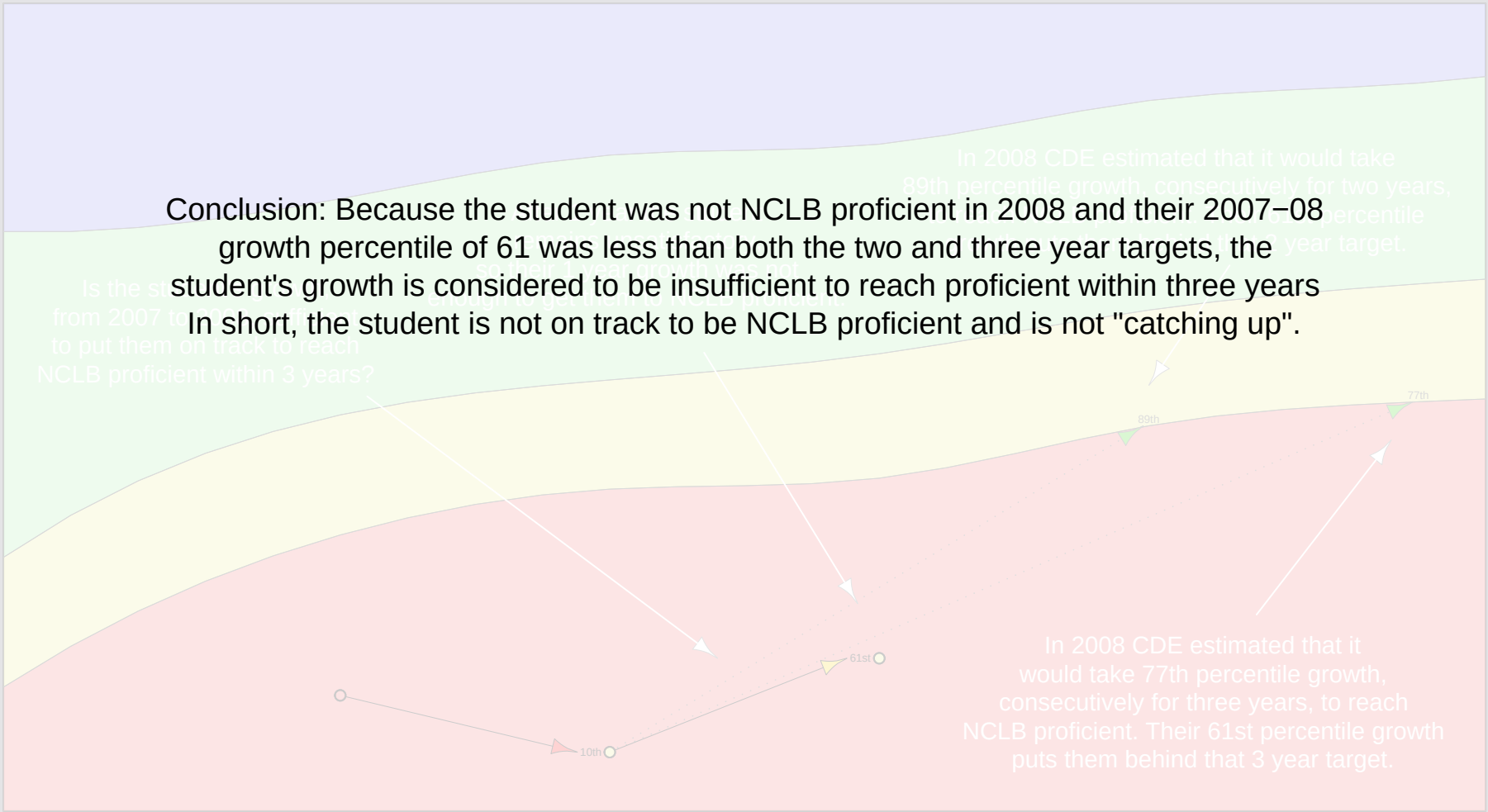

Not On Track to Reach NCLB Proficient − Not Catching Up
61st
10th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010


Is the student's growth, from 2007 to 2008, sufficient to put them on track to reach NCLB proficient within 3 years?
61st
10th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

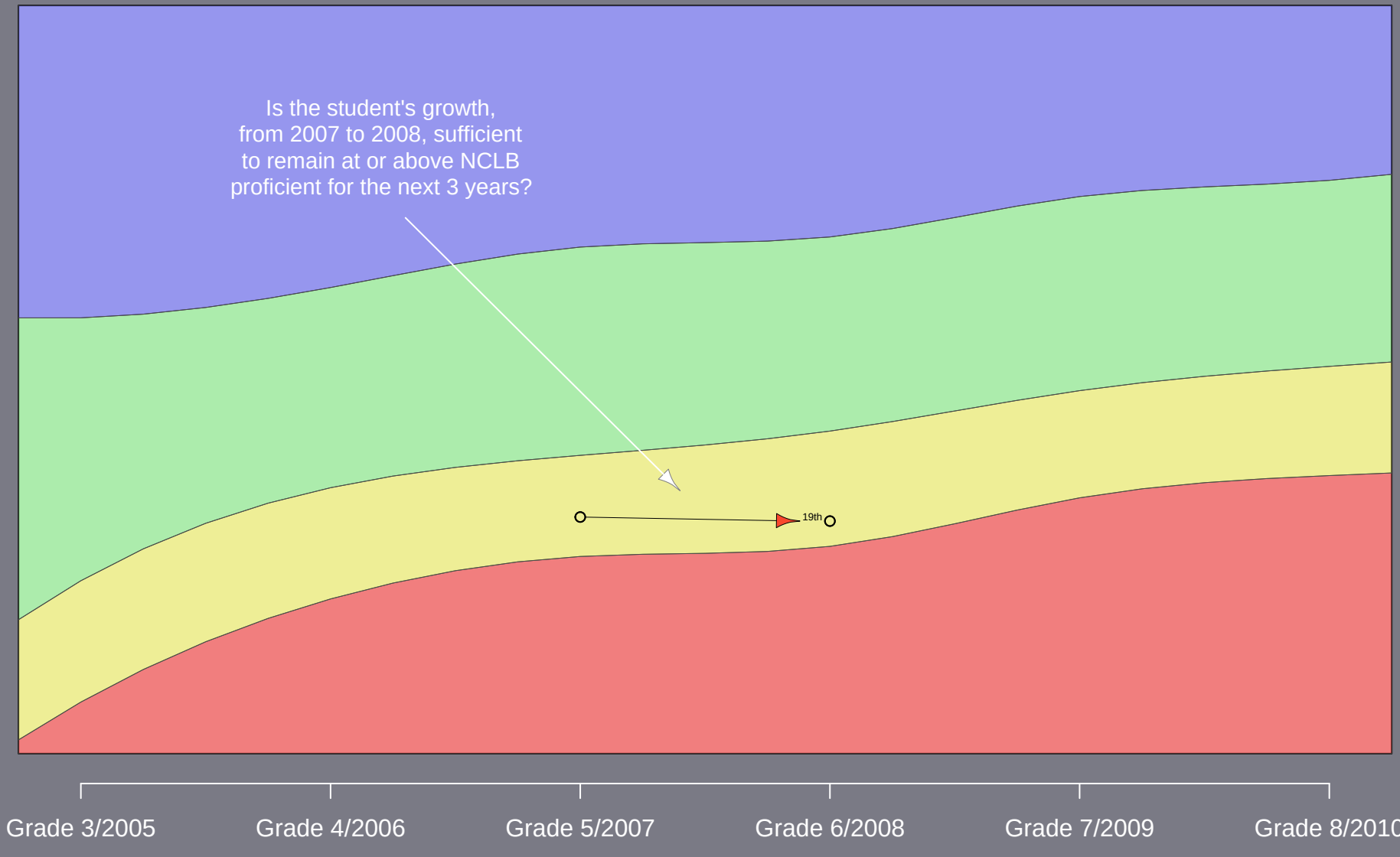

Is the student's growth, from 2007 to 2008, sufficient to put them on track to reach NCLB proficient within 3 years?
After 1 year the student remains unsatisfactory, so their 1 year growth was not enough to get them to NCLB proficient.
10th
61st
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

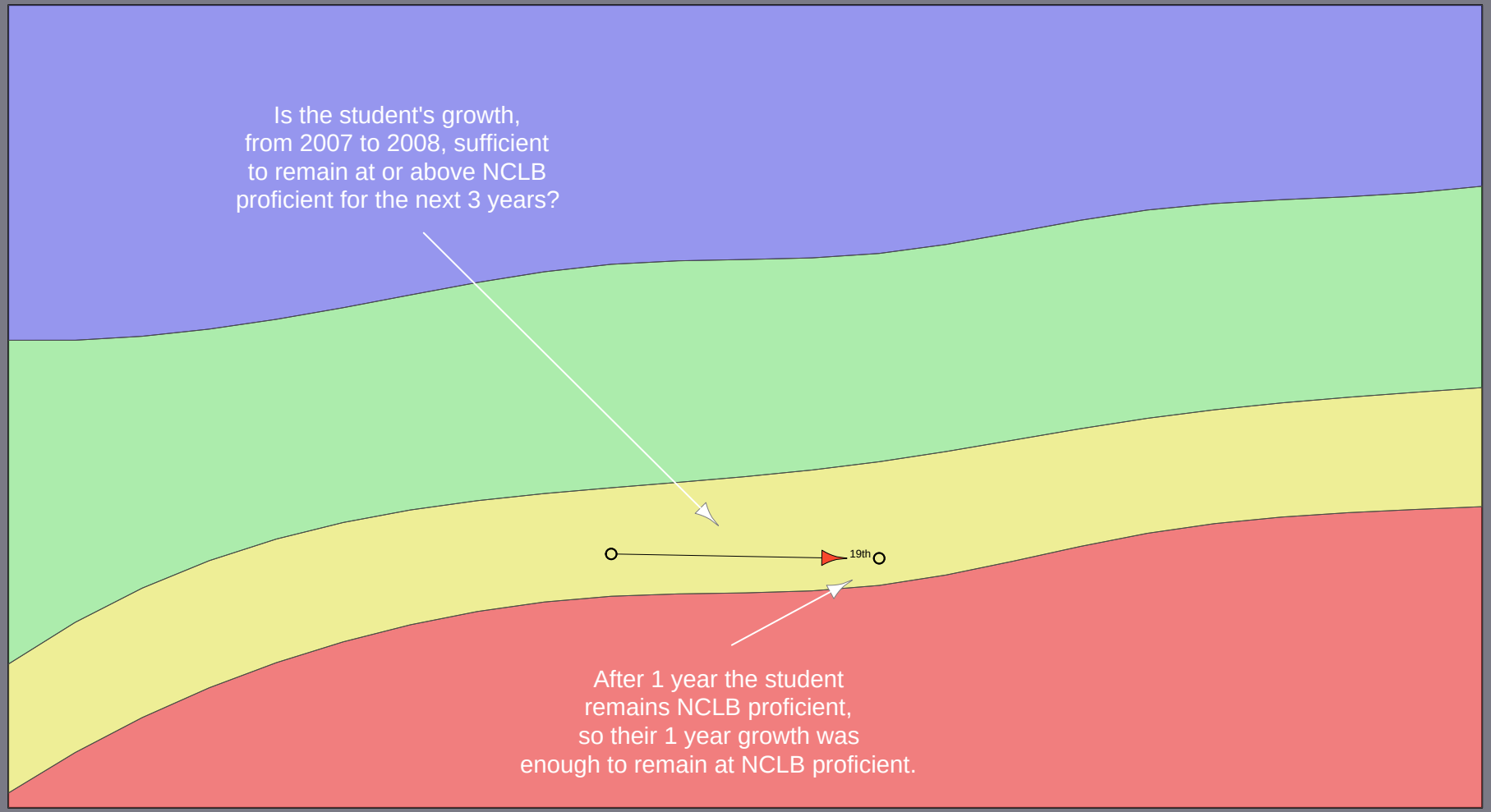

Is the student's growth, from 2007 to 2008, sufficient to put them on track to reach NCLB proficient within 3 years?
After 1 year the student remains unsatisfactory, so their 1 year growth was not enough to get them to NCLB proficient.
In 2008 CDE estimated that it would take 89th percentile growth, consecutively for two years, to reach NCLB proficient. Their 61st percentile growth puts them behind that 2 year target.
89th
61st
10th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

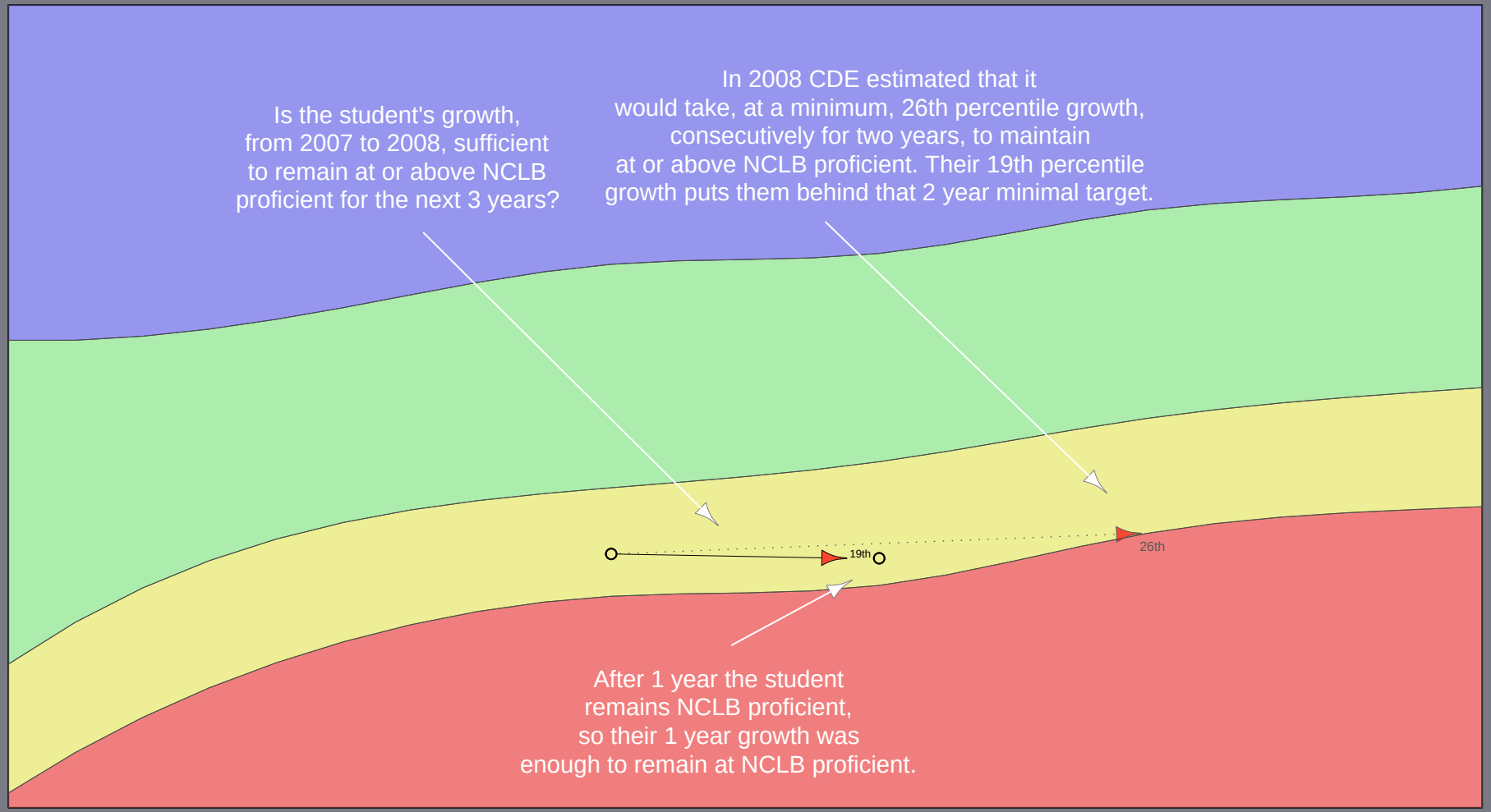

Is the student's growth, from 2007 to 2008, sufficient to put them on track to reach NCLB proficient within 3 years?
After 1 year the student remains unsatisfactory, so their 1 year growth was not enough to get them to NCLB proficient.
In 2008 CDE estimated that it would take 89th percentile growth, consecutively for two years, to reach NCLB proficient. Their 61st percentile growth puts them behind that 2 year target.
In 2008 CDE estimated that it would take 77th percentile growth, consecutively for three years, to reach NCLB proficient. Their 61st percentile growth puts them behind that 3 year target.
10th
61st
89th
77th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

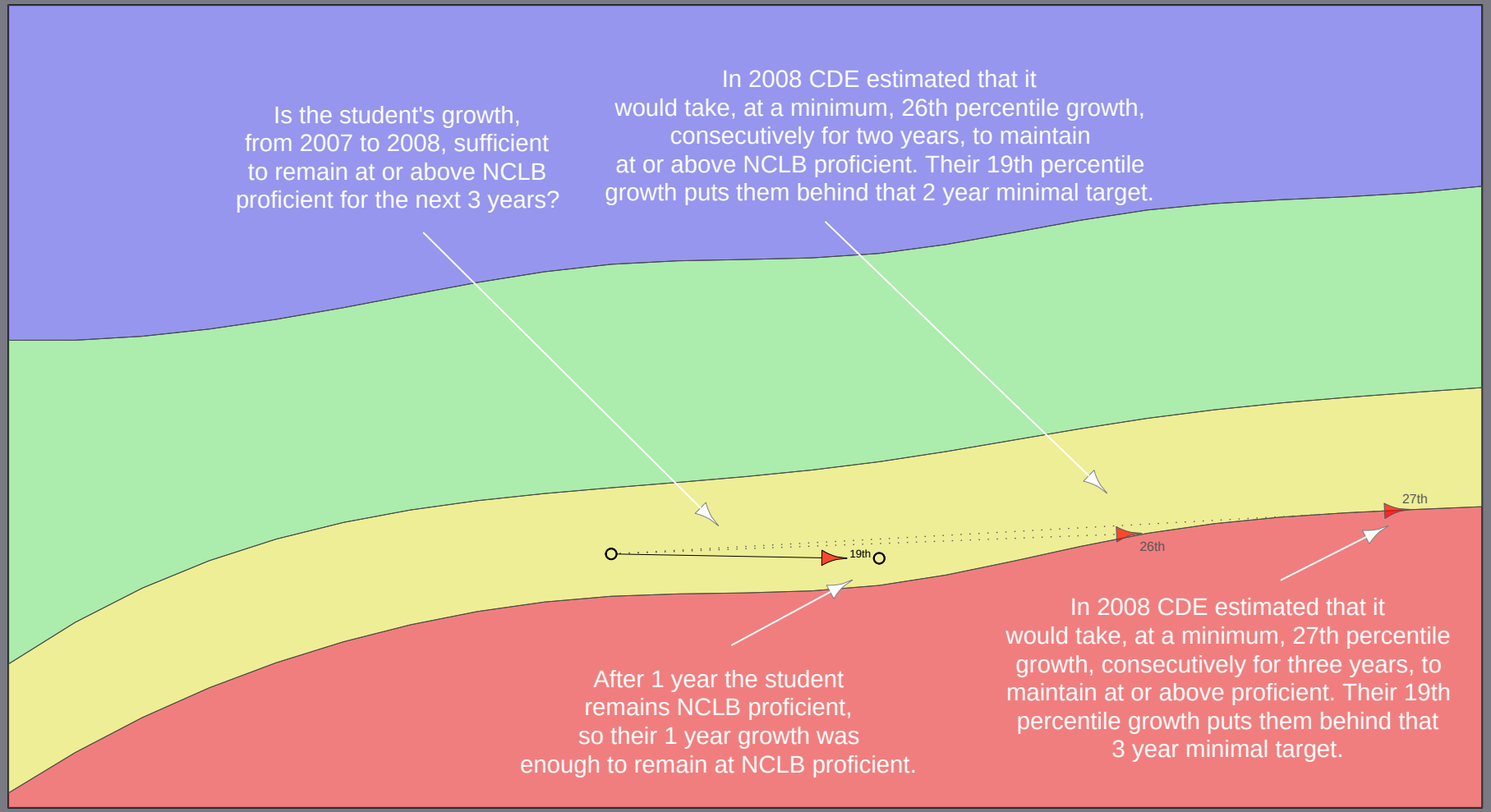

Conclusion: Because the student was not NCLB proficient in 2008 and their 2007−08 growth percentile of 61 was less than both the two and three year targets, the student's growth is considered to be insufficient to reach proficient within three years
In short, the student is not on track to be NCLB proficient and is not "catching up".
In 2008 CDE estimated that it would take 89th percentile growth, consecutively for two years, to put them on track to reach NCLB proficient within 3 years?
In 2008 CDE estimated that it would take 77th percentile growth, consecutively for three years, to reach NCLB proficient. Their 61st percentile growth puts them behind that 3 year target.
89th
77th
61st
10th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

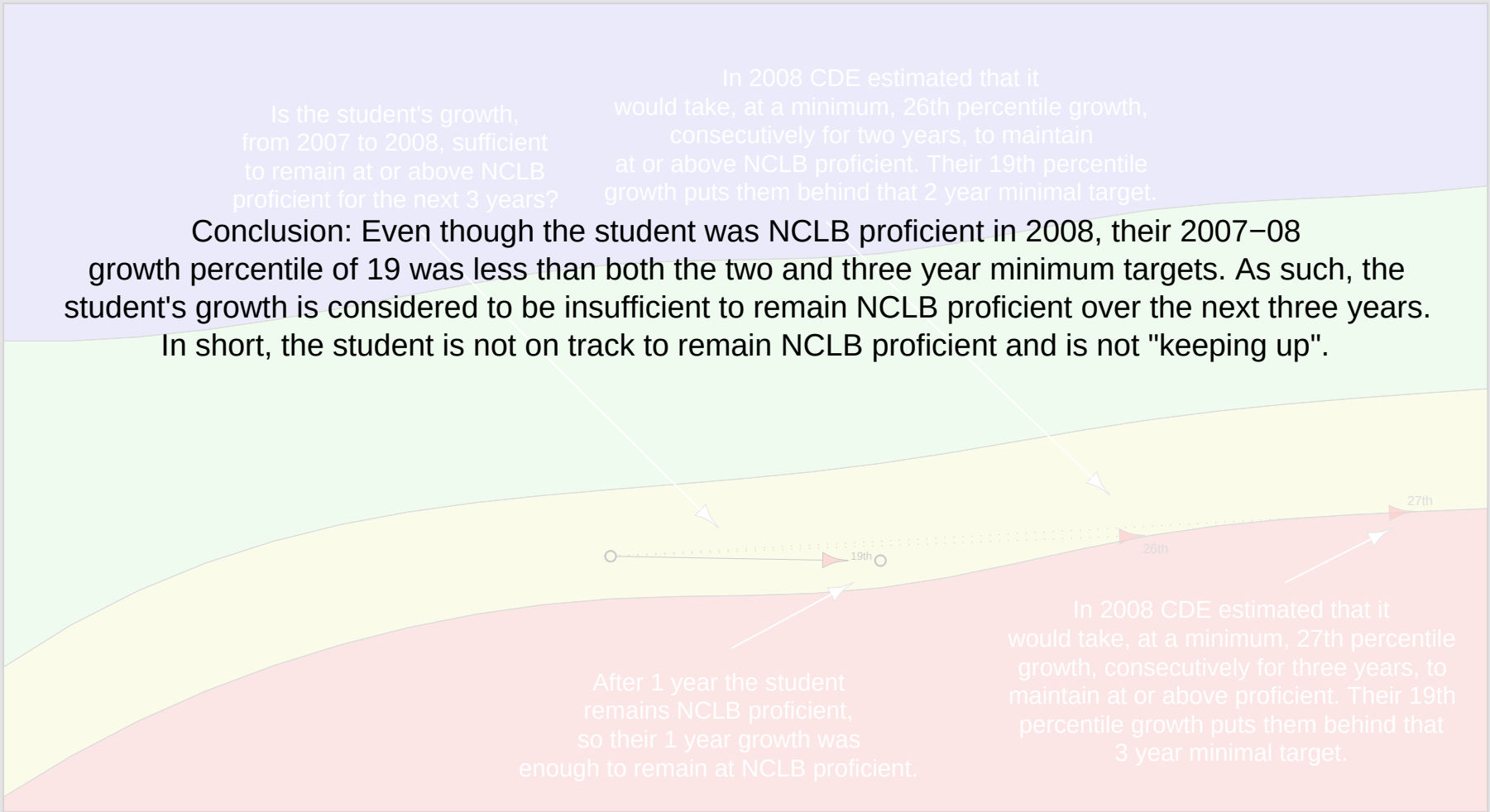

Not On Track to Remain NCLB Proficient – Not Keeping Up
19th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

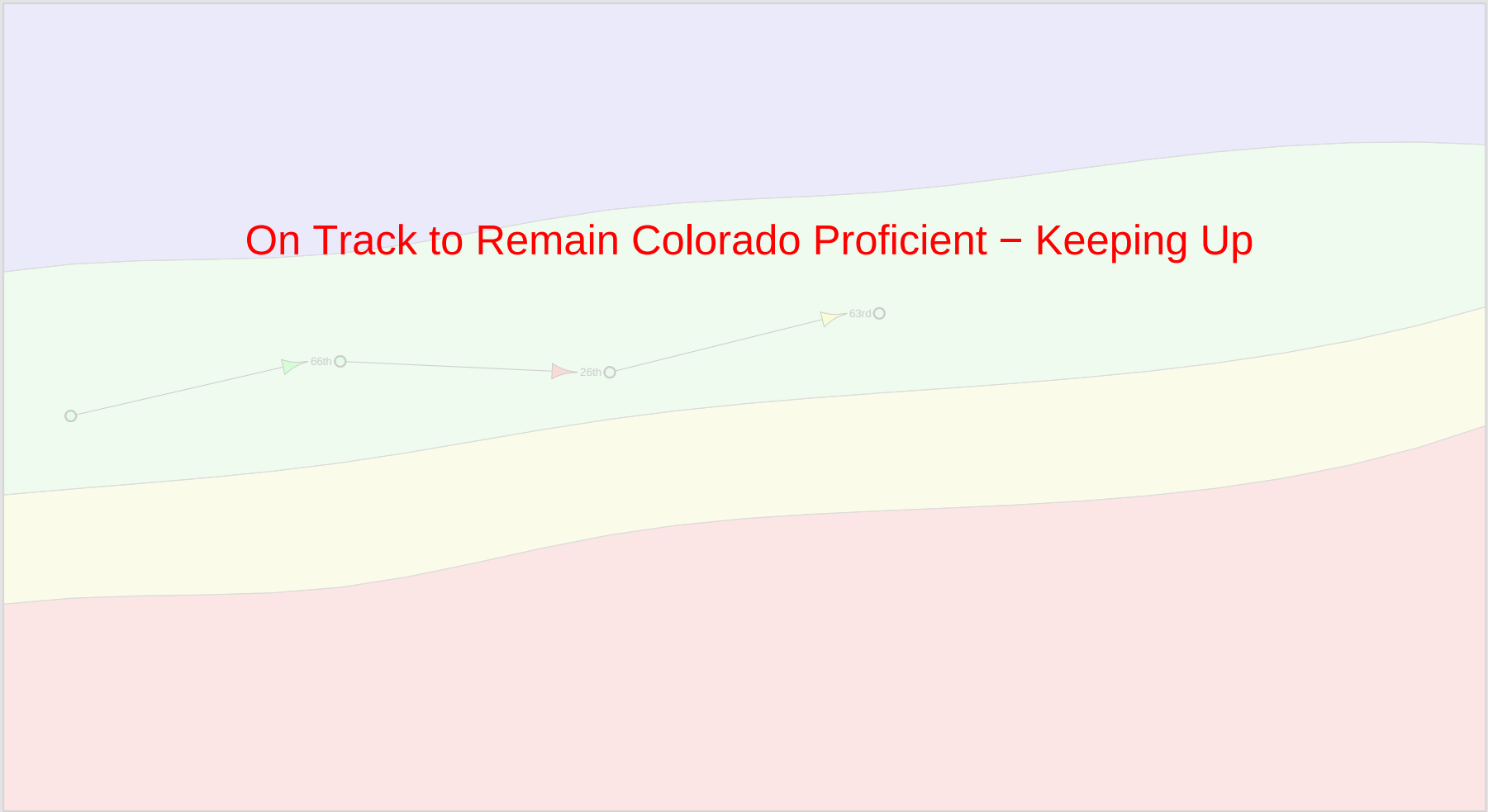

Is the student's growth, from 2007 to 2008, sufficient to remain at or above NCLB proficient for the next 3 years?
19th
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

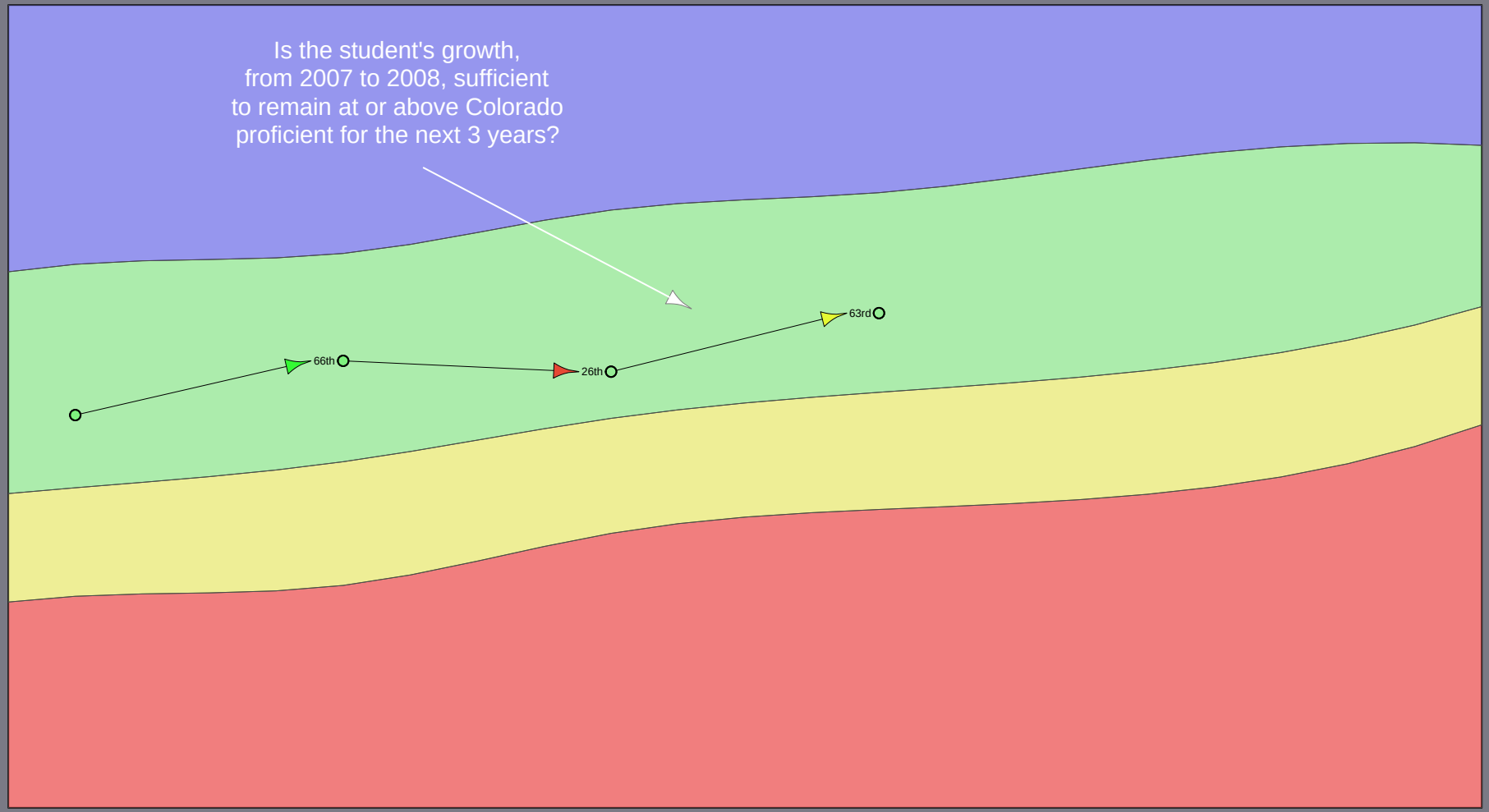

Is the student's growth, from 2007 to 2008, sufficient to remain at or above NCLB proficient for the next 3 years?
19th
After 1 year the student remains NCLB proficient, so their 1 year growth was enough to remain at NCLB proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

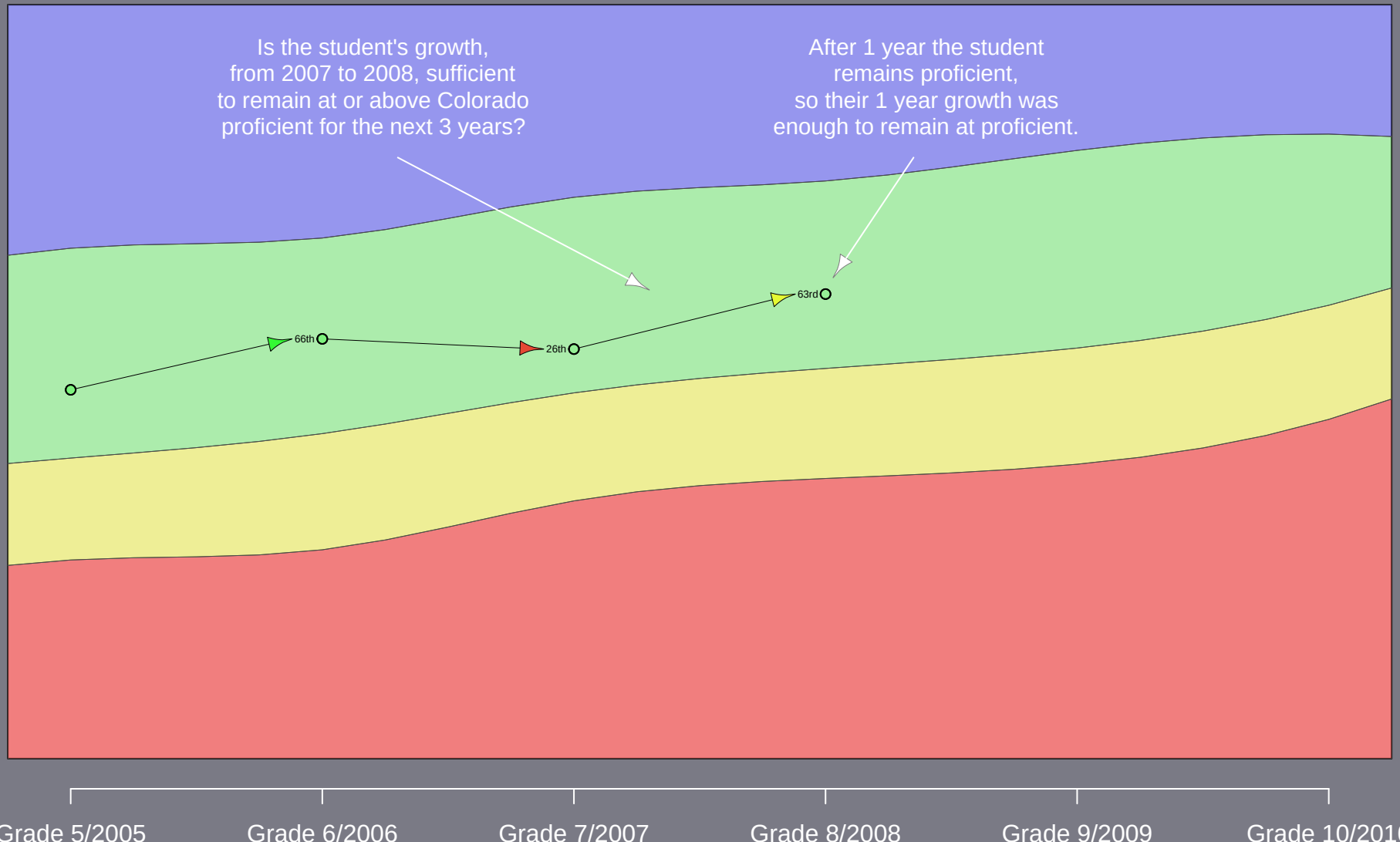

Is the student's growth, from 2007 to 2008, sufficient to remain at or above NCLB proficient for the next 3 years?
In 2008 CDE estimated that it would take, at a minimum, 26th percentile growth, consecutively for two years, to maintain at or above NCLB proficient. Their 19th percentile growth puts them behind that 2 year minimal target.
19th
26th
After 1 year the student remains NCLB proficient, so their 1 year growth was enough to remain at NCLB proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

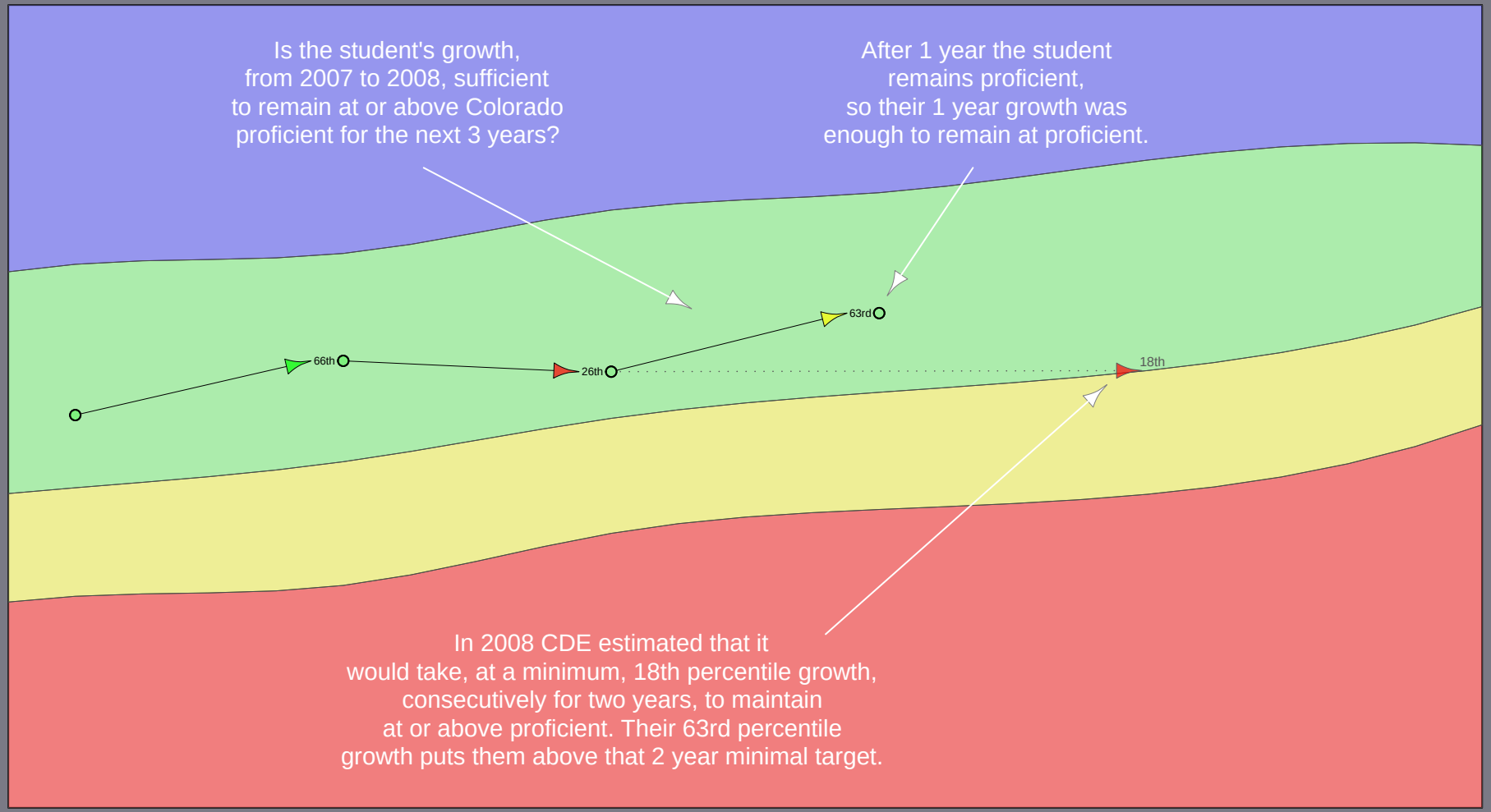

Is the student's growth, from 2007 to 2008, sufficient to remain at or above NCLB proficient for the next 3 years?
In 2008 CDE estimated that it would take, at a minimum, 26th percentile growth, consecutively for two years, to maintain at or above NCLB proficient. Their 19th percentile growth puts them behind that 2 year minimal target.
19th
26th
27th
After 1 year the student remains NCLB proficient, so their 1 year growth was enough to remain at NCLB proficient.
In 2008 CDE estimated that it would take, at a minimum, 27th percentile growth, consecutively for three years, to maintain at or above proficient. Their 19th percentile growth puts them behind that 3 year minimal target.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

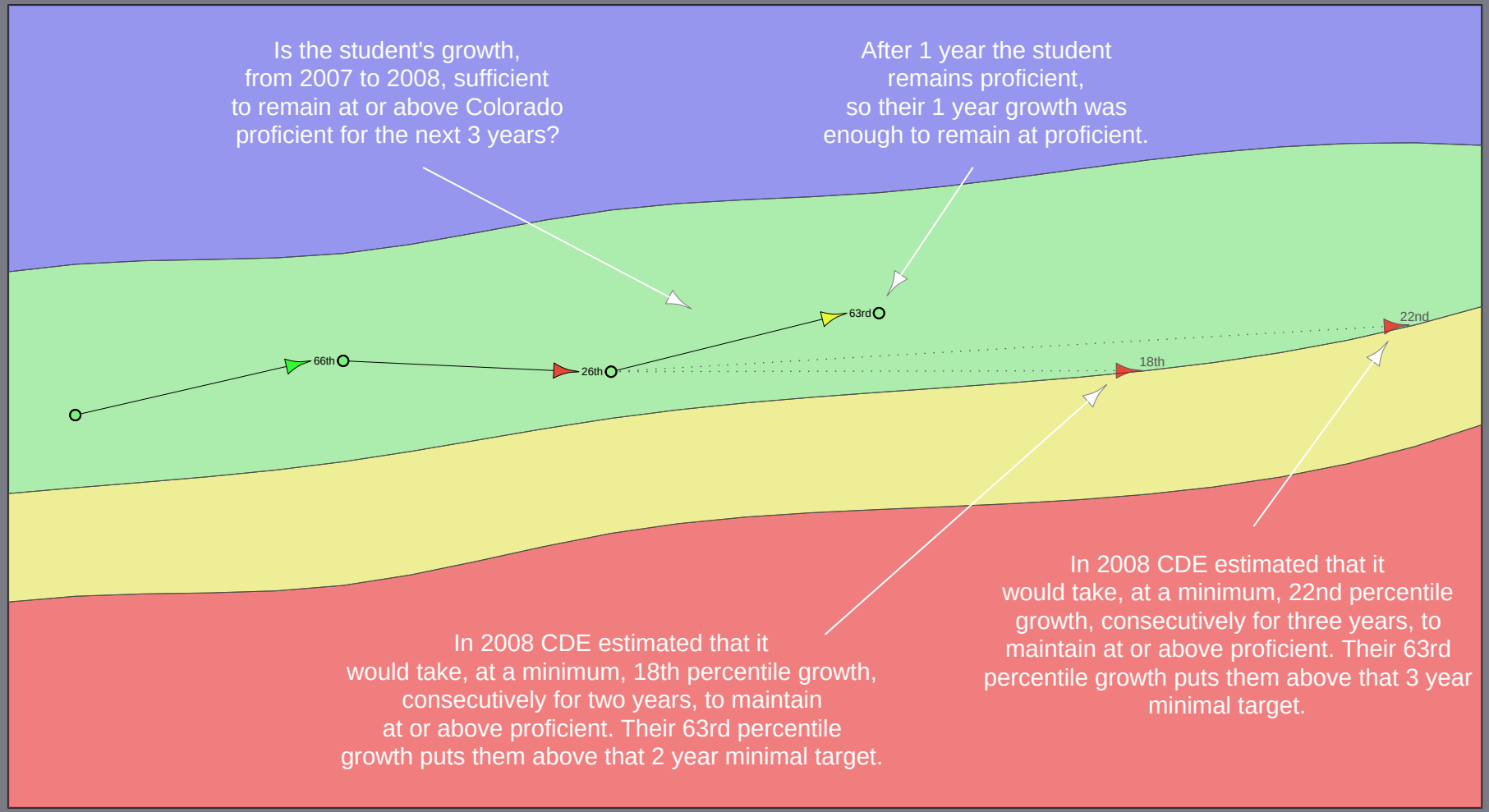

Is the student's growth, from 2007 to 2008, sufficient to remain at or above NCLB proficient for the next 3 years?
In 2008 CDE estimated that it would take, at a minimum, 26th percentile growth, consecutively for two years, to maintain at or above NCLB proficient. Their 19th percentile growth puts them behind that 2 year minimal target.
Conclusion: Even though the student was NCLB proficient in 2008, their 2007−08 growth percentile of 19 was less than both the two and three year minimum targets. As such, the student's growth is considered to be insufficient to remain NCLB proficient over the next three years. In short, the student is not on track to remain NCLB proficient and is not "keeping up".
19th
26th
27th
After 1 year the student remains NCLB proficient, so their 1 year growth was enough to remain at NCLB proficient.
In 2008 CDE estimated that it would take, at a minimum, 27th percentile growth, consecutively for three years, to maintain at or above proficient. Their 19th percentile growth puts them behind that 3 year minimal target.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

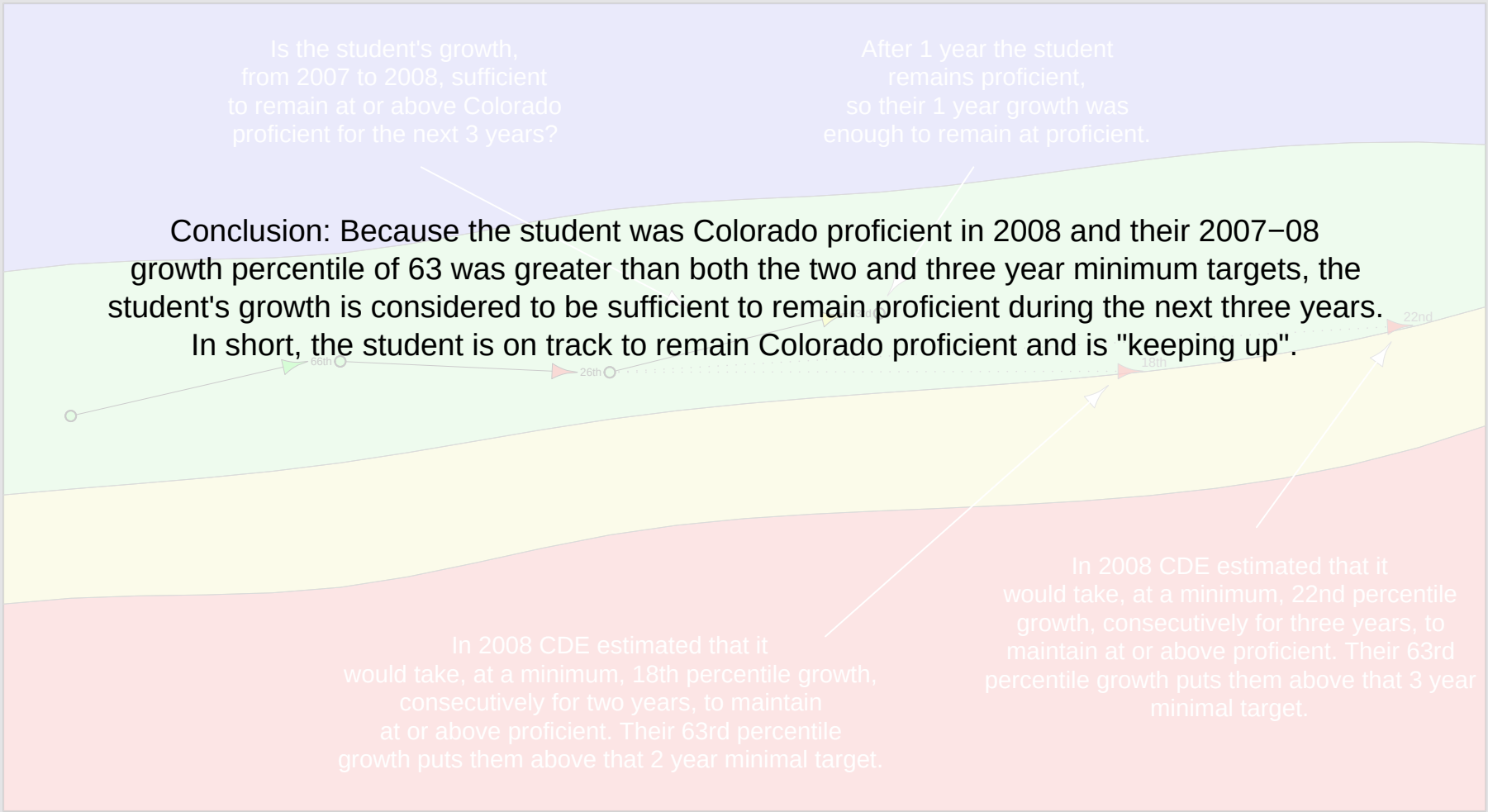

On Track to Remain Colorado Proficient − Keeping Up
66th
26th
63rd
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

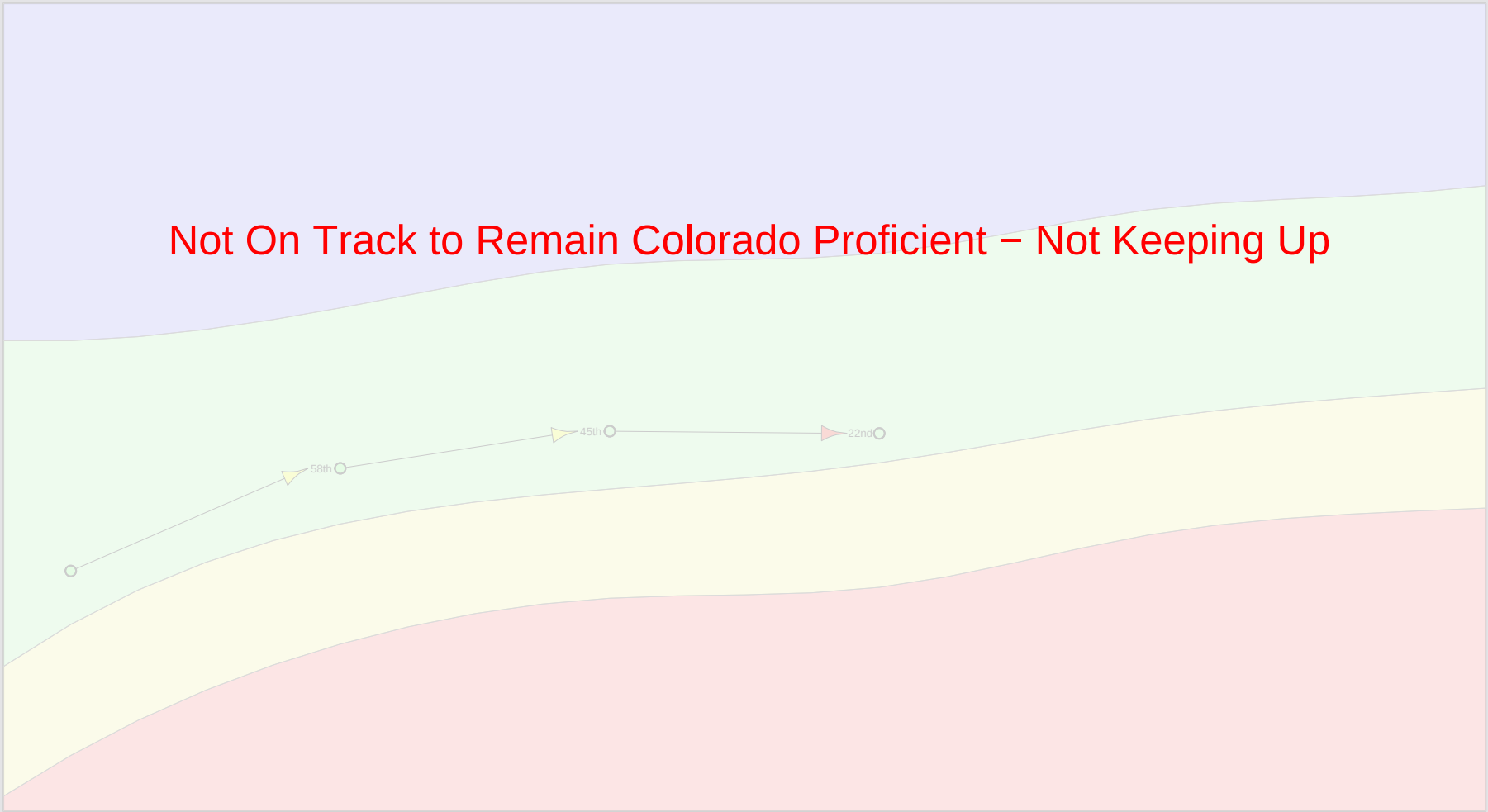

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
66th
26th
63rd
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

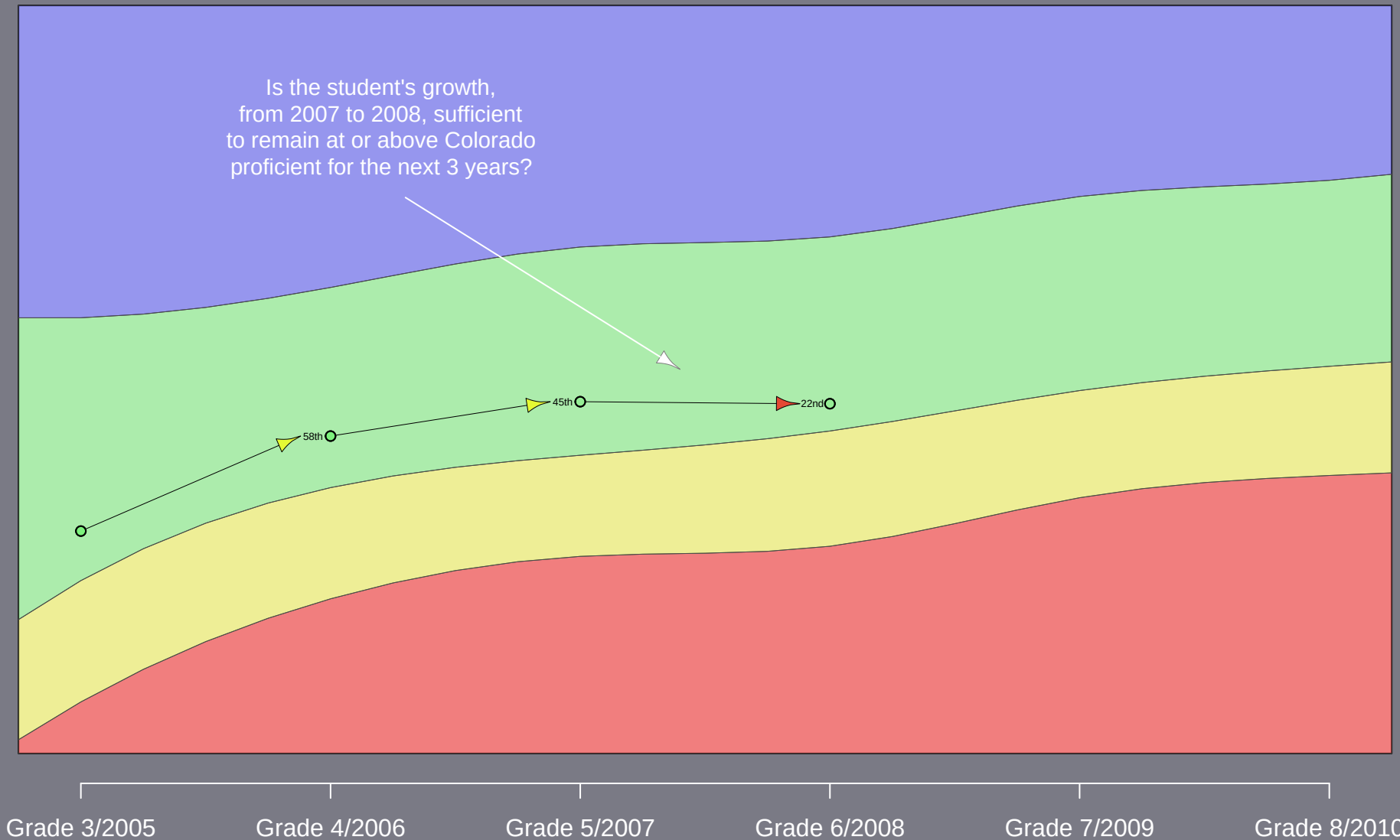

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
66th
26th
63rd
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

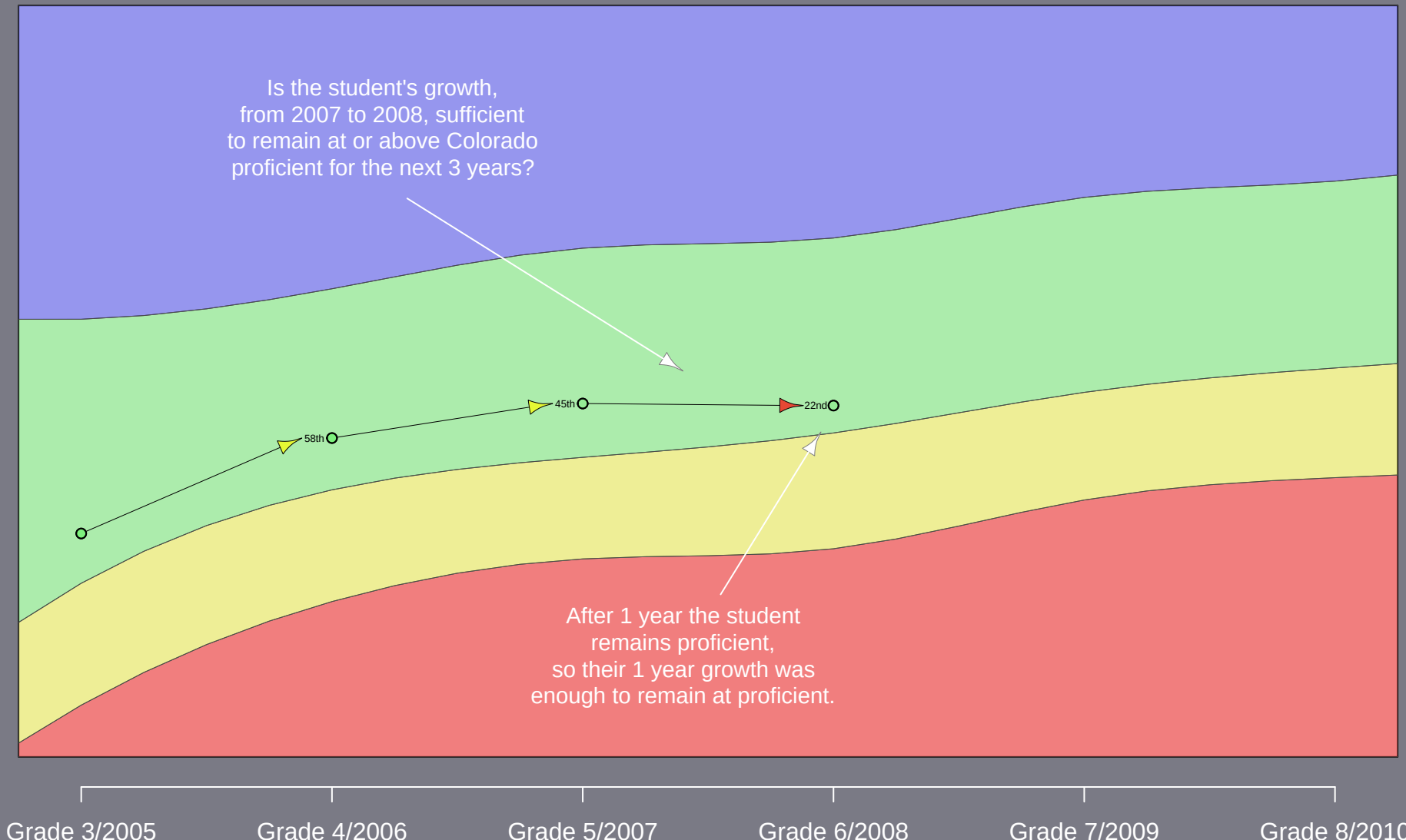

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
66th
26th
63rd
18th
In 2008 CDE estimated that it would take, at a minimum, 18th percentile growth, consecutively for two years, to maintain at or above proficient. Their 63rd percentile growth puts them above that 2 year minimal target.
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

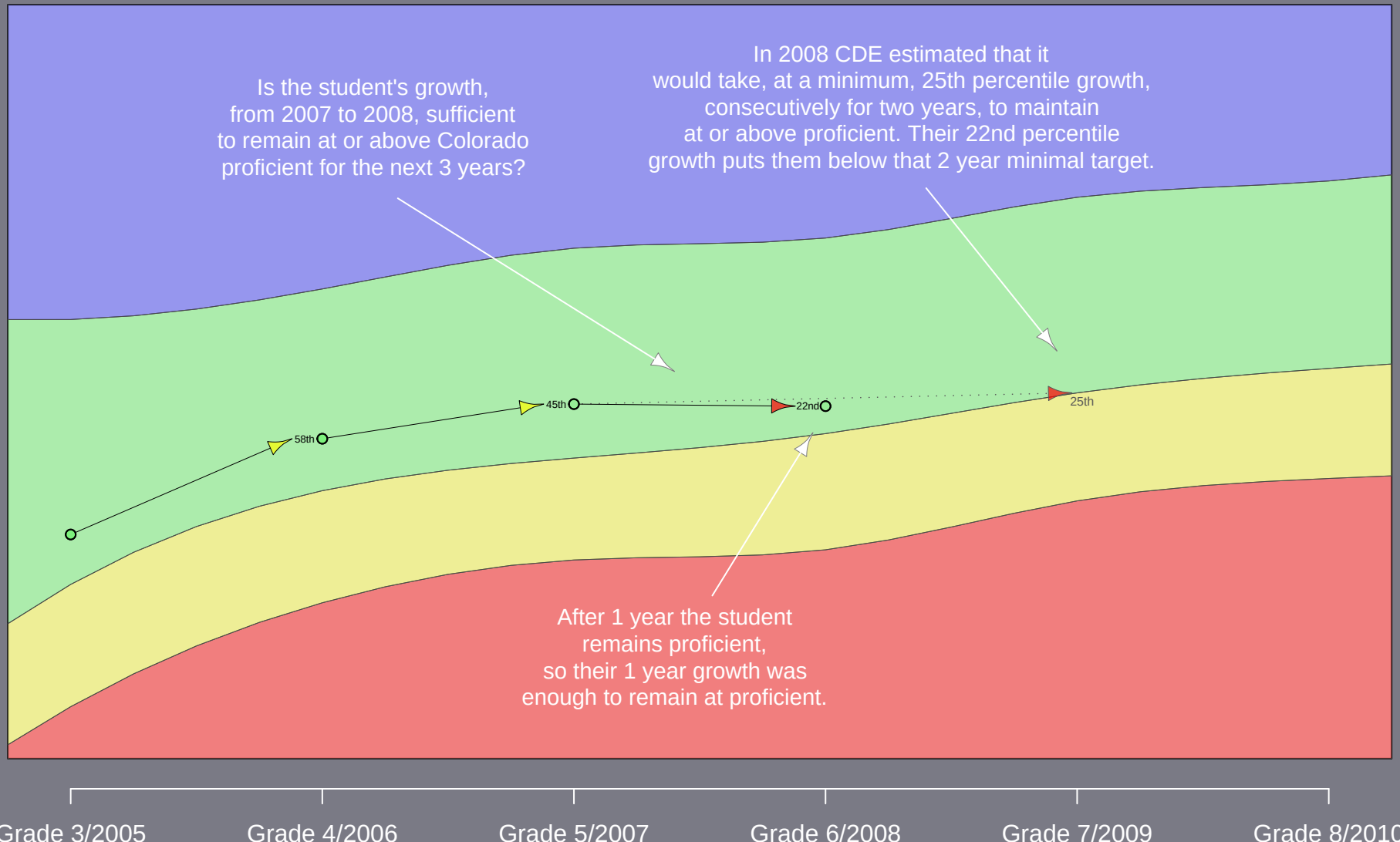

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
66th
26th
63rd
18th
22nd
In 2008 CDE estimated that it would take, at a minimum, 18th percentile growth, consecutively for two years, to maintain at or above proficient. Their 63rd percentile growth puts them above that 2 year minimal target.
In 2008 CDE estimated that it would take, at a minimum, 22nd percentile growth, consecutively for three years, to maintain at or above proficient. Their 63rd percentile growth puts them above that 3 year minimal target.
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

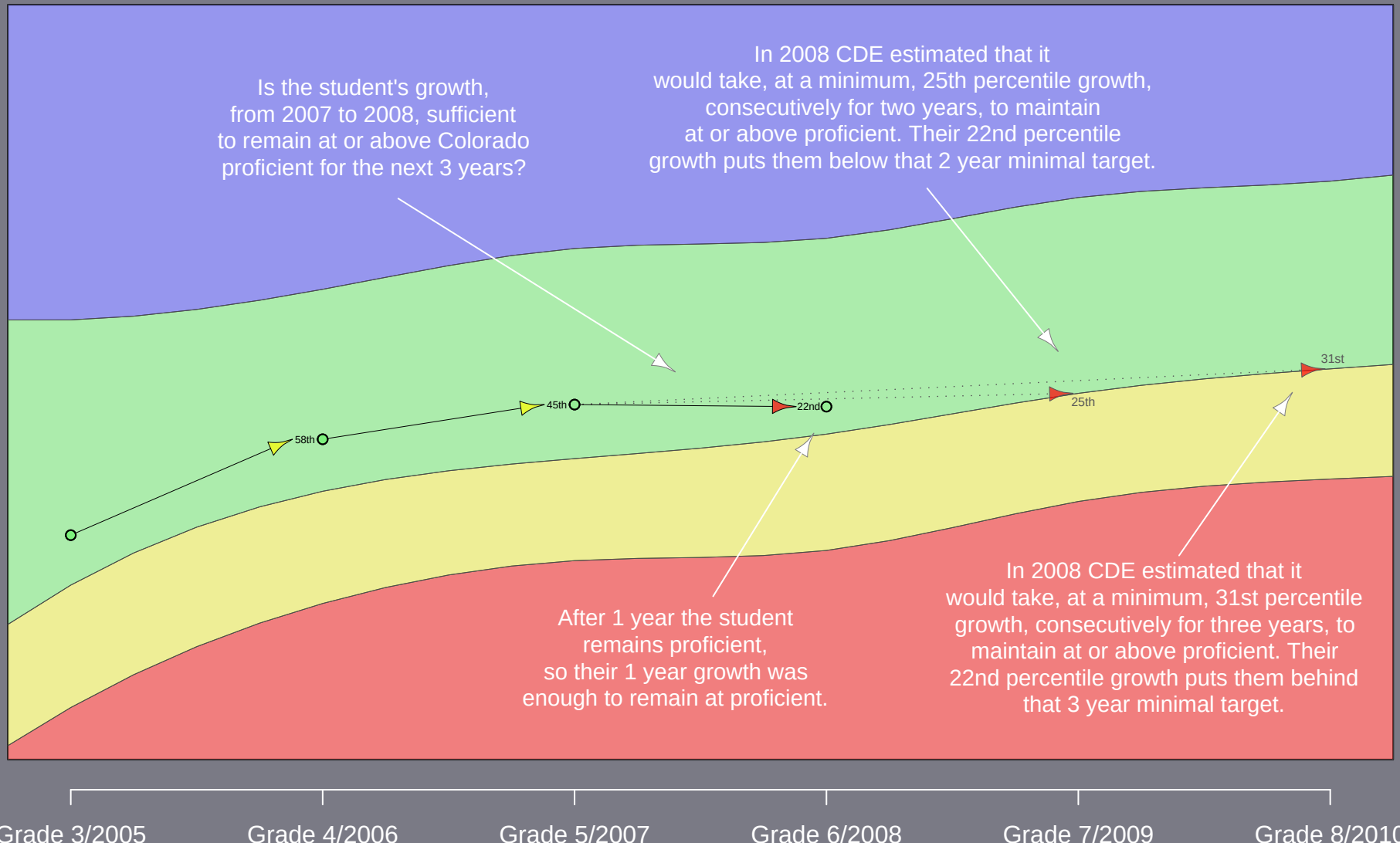

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
Conclusion: Because the student was Colorado proficient in 2008 and their 2007−08 growth percentile of 63 was greater than both the two and three year minimum targets, the student's growth is considered to be sufficient to remain proficient during the next three years. In short, the student is on track to remain Colorado proficient and is "keeping up".
26th
22nd
In 2008 CDE estimated that it would take, at a minimum, 18th percentile growth, consecutively for two years, to maintain at or above proficient. Their 63rd percentile growth puts them above that 2 year minimal target.
In 2008 CDE estimated that it would take, at a minimum, 22nd percentile growth, consecutively for three years, to maintain at or above proficient. Their 63rd percentile growth puts them above that 3 year minimal target.
Grade 5/2005
Grade 6/2006
Grade 7/2007
Grade 8/2008
Grade 9/2009
Grade 10/2010

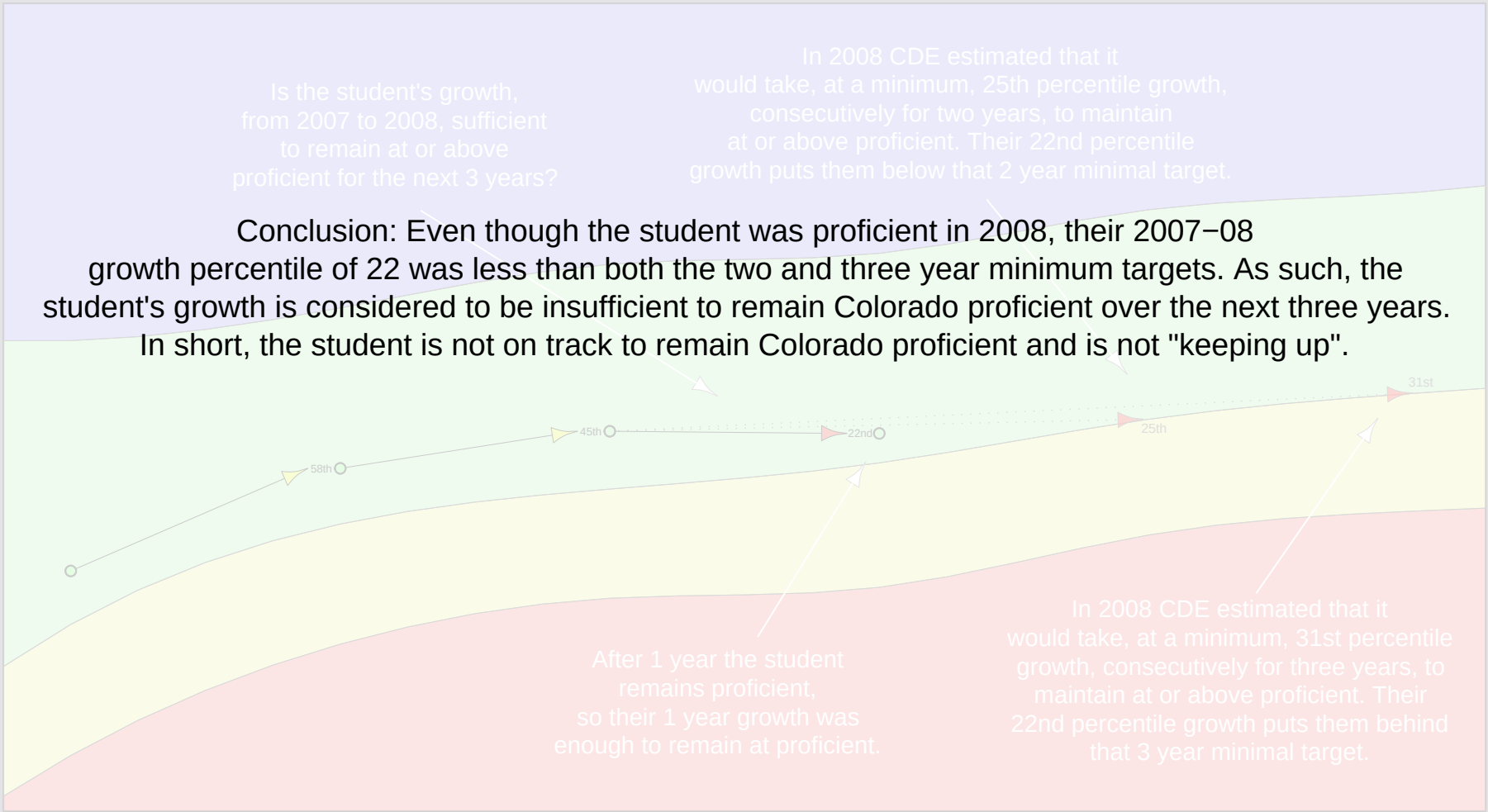

Not On Track to Remain Colorado Proficient − Not Keeping Up
58th
45th
22nd
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010


Is the student's growth,
from 2007 to 2008, sufficient
to remain at or above Colorado
proficient for the next 3 years?
58th
45th
22nd
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010


Is the student's growth,
from 2007 to 2008, sufficient
to remain at or above Colorado
proficient for the next 3 years?
58th
45th
22nd
After 1 year the student
remains proficient,
so their 1 year growth was
enough to remain at proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010


Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
In 2008 CDE estimated that it would take, at a minimum, 25th percentile growth, consecutively for two years, to maintain at or above proficient. Their 22nd percentile growth puts them below that 2 year minimal target.
58th
45th
22nd
25th
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

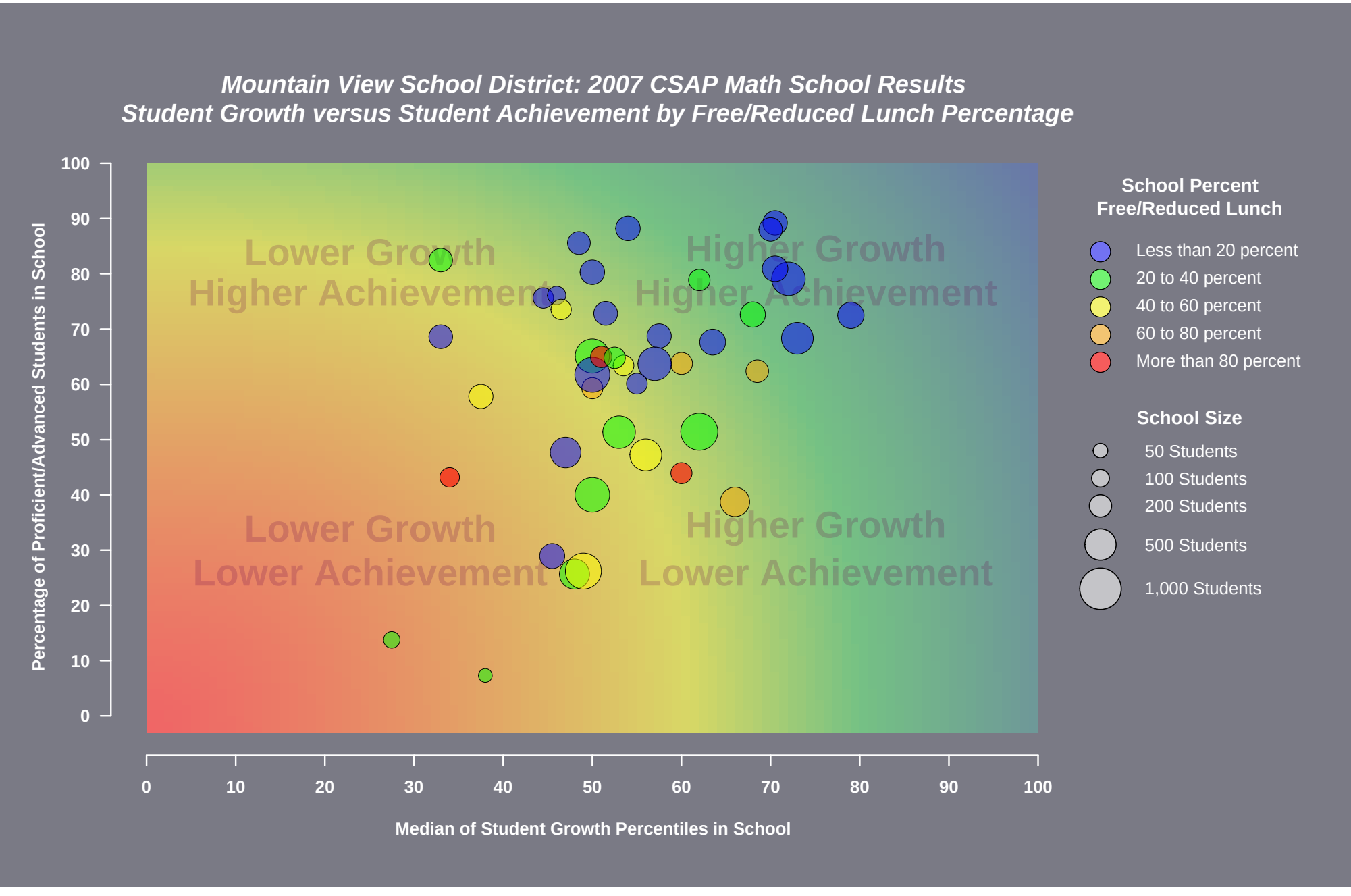

Is the student's growth, from 2007 to 2008, sufficient to remain at or above Colorado proficient for the next 3 years?
In 2008 CDE estimated that it would take, at a minimum, 25th percentile growth, consecutively for two years, to maintain at or above proficient. Their 22nd percentile growth puts them below that 2 year minimal target.
58th
45th
22nd
25th
31st
After 1 year the student remains proficient, so their 1 year growth was enough to remain at proficient.
In 2008 CDE estimated that it would take, at a minimum, 31st percentile growth, consecutively for three years, to maintain at or above proficient. Their 22nd percentile growth puts them behind that 3 year minimal target.
Grade 3/2005
Grade 4/2006
Grade 5/2007
Grade 6/2008
Grade 7/2009
Grade 8/2010

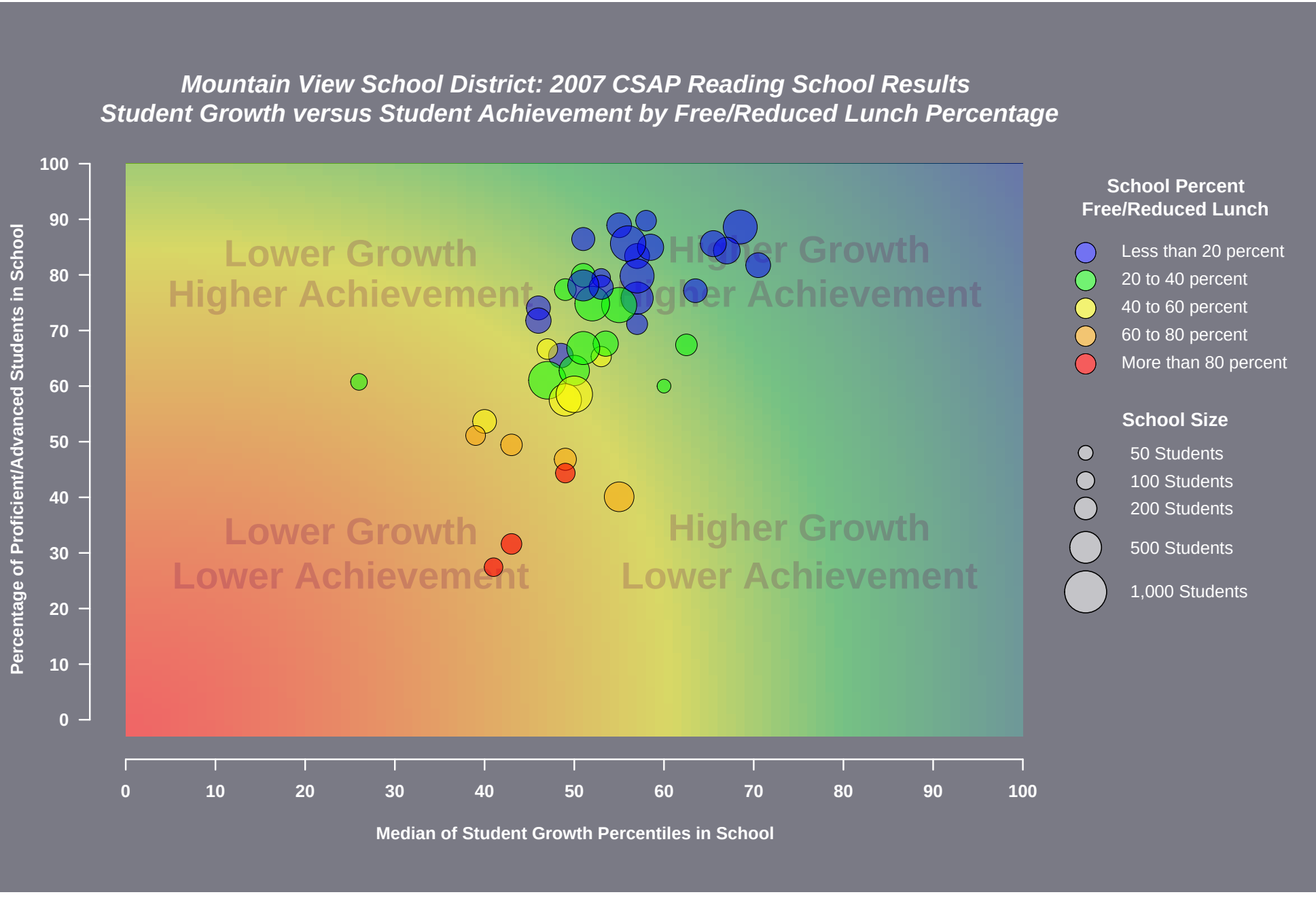


Conclusion: Even though the student was proficient in 2008, their 2007−08 growth percentile of 22 was less than both the two and three year minimum targets. As such, the student's growth is considered to be insufficient to remain Colorado proficient over the next three years. In short, the student is not on track to remain Colorado proficient and is not "keeping up".

Going from Students to Schools

- It's of interest to examine schools where students demonstrate, on average, extraordinarily high and low student growth.
- To summarize the student growth percentiles associated with a school (or other grouping) calculate the median of the student growth percentiles.
- If students were randomly assigned to schools, expect to see a median of 50.
- Values greatly above or below 50 are of interest in identifying best practices or providing extra support.
- Examining growth with achievement sheds new light on school performance.


Mountain View School District: 2007 CSAP Math School Results
Student Growth versus Student Achievement by Free/Reduced Lunch Percentage
Lower Growth
Higher Achievement
Higher Growth
Higher Achievement
Lower Growth
Lower Achievement
Higher Growth
Lower Achievement
Percentage of Proficient/Advanced Students in School
0
10
20
30
40
50
60
70
80
90
100
Median of Student Growth Percentiles in School
School Percent
Free/Reduced Lunch
Less than 20 percent
20 to 40 percent
40 to 60 percent
60 to 80 percent
More than 80 percent
School Size
50 Students
100 Students
200 Students
500 Students
1,000 Students


Mountain View School District: 2007 CSAP Reading School Results
Student Growth versus Student Achievement by Free/Reduced Lunch Percentage
Lower Growth
Higher Achievement
Higher Growth
Higher Achievement
Lower Growth
Lower Achievement
Higher Growth
Lower Achievement
Percentage of Proficient/Advanced Students in School
0
10
20
30
40
50
60
70
80
90
100
Median of Student Growth Percentiles in School
0
10
20
30
40
50
60
70
80
90
100
School Percent
Free/Reduced Lunch
Less than 20 percent
20 to 40 percent
40 to 60 percent
60 to 80 percent
More than 80 percent
School Size
50 Students
100 Students
200 Students
500 Students
1,000 Students

Growth, Effectiveness, and Value-Added

Fundamental Premise

"Good" schools bring about student growth in excess of that found at "bad" schools.

- "Good schools" are often called highly effective schools.
- What's the relationship between growth and effectiveness?
- Effectiveness indicates who/what is responsible for the growth (value-added models).

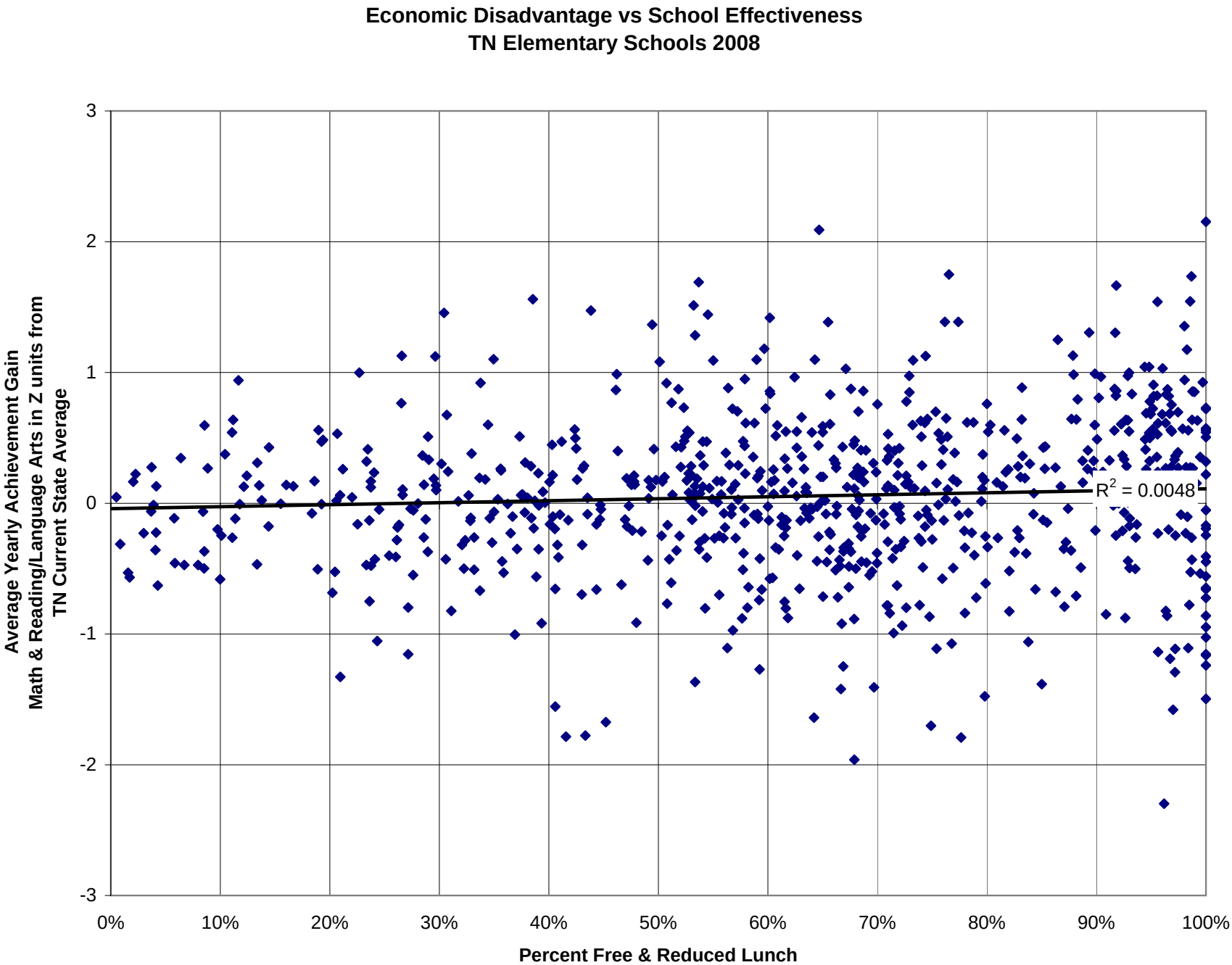
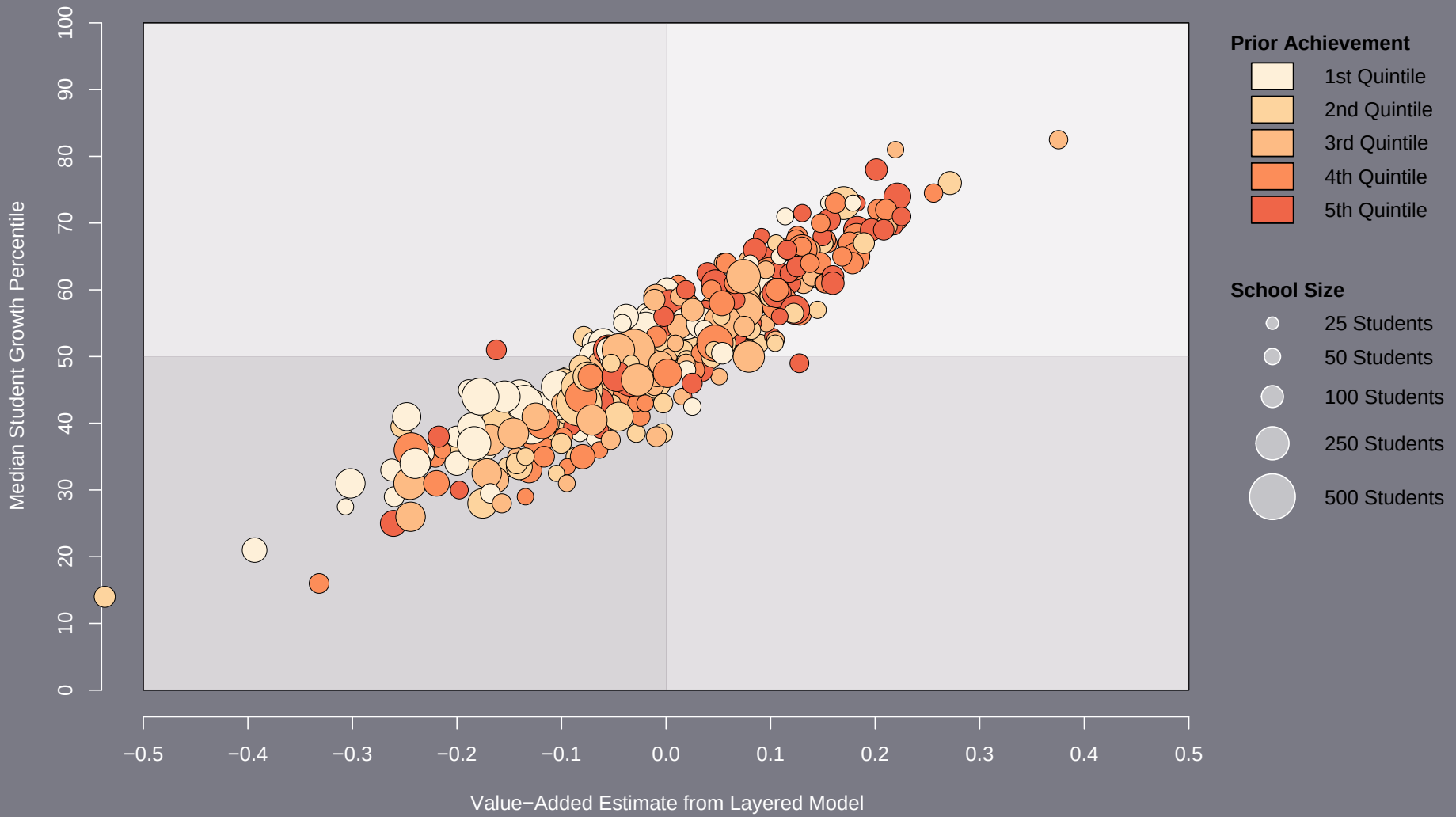

Economic Disadvantage vs School Effectiveness
TN Elementary Schools 2008
Average Yearly Achievement Gain
Math & Reading/Language Arts in Z units from
TN Current State Average
3
2
1
0
-1
-2
-3
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent Free & Reduced Lunch
R2 = 0.0048

Figure 4c: Grade 6 (2006) Layered Model versus Quantile Regression Estimates (SEP3ML Scale) by Prior Achievement Quintile (School Size >= 50)



References


Berk, R. A. (2003).
Regression Analysis: A Constructive Critique.
Sage, Thousand Oaks, CA.


Linn, R. L. (2008).
Educational accountability systems.
In *The Future of Test-Based Educational Accountability*, pages 3–24.
Taylor & Francis, New York.


Yen, W. M. (2007).
Vertical scaling and No Child Left Behind.
In Dorans, N. J., Pommerich, M., and Holland, P. W., editors, *Linking and Aligning Scores and Scales*, pages 273–283. Springer, New York.