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Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

In re	)	
DISTRIBUTION OF CABLE ROYALTY FUNDS	)	**NO. 14-CRB-0010-CD (2010–13)**

AMENDED AND CORRECTED WRITTEN REBUTTAL TESTIMONY
OF THE JOINT SPORTS CLAIMANTS

Pursuant to the Copyright Royalty Judges' ("Judges") *Order Continuing Hearing and Permitting Amended Written Rebuttal Statements, Denying Other Motions, and Reserving Ruling on Other Requests*, Dkt. No. 14-CRB-0010-CD (2010-13) (Jan. 26, 2018), the Joint Sports Claimants[1] ("JSC") hereby submit the attached amendments to: (1) the Written Rebuttal Testimony of Dr. William E. Wecker and R. Garrison Harvey ("Wecker Testimony"), filed on September 15, 2017; (2) Dr. Wecker and Mr. Harvey's report entitled "Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Distribution Proceedings Before the Copyright Royalty Judges" ("Wecker Report"), filed September 15, 2017; (3) the Corrected Written Rebuttal Testimony of Susan Nathan, filed on October 5, 2017; and (4) the Written Rebuttal Testimony of Dr. Mark A. Israel, filed on September 15, 2017.

On January 22, 2018, the Program Suppliers filed their Third Errata to Amended and Corrected Written Direct Statement and Second Errata to Written Rebuttal Statement Regarding Allocation Methodologies of Program Suppliers, in order to file amended written direct and rebuttal testimony for Dr. Jeffrey S. Gray (the "2018 Gray Testimony"). In the 2018 Gray

[1] The Joint Sports Claimants are comprised of the Office of the Commissioner of Baseball, the National Football League, the National Basketball Association, the Women's National Basketball Association, the National Hockey League and the National Collegiate Athletic Association.

Testimony, Dr. Gray acknowledges that his earlier testimony was based upon inaccurate viewing data for WGN America ("WGNA"), and substitutes new data that purports to remedy these inaccuracies. Dr. Gray also changes his methodology by incorporating Nielsen National People Meter ("NPM") weights to estimate "distant viewing," and by splitting his regression analysis into two discrete parts, one for WGNA alone, and one for all of the other stations in Dr. Gray's sample. These changes affected Dr. Gray's bottom-line conclusions regarding the relative levels of predicted "distant viewing" among the participants to this proceeding.

The Wecker Testimony and Wecker Report addressed the Written Direct Testimony of Dr. Jeffrey S. Gray, Ph.D., filed on April 3, 2017 ("2017 Gray Testimony"). The purpose of the Wecker Testimony and Report was to determine how Dr. Gray arrived at the estimates in Table 1 and Table 2 of his 2017 testimony, and whether the data, approaches and analyses underlying his testimony supported those estimates. Table 1 of the 2017 Gray Testimony purported to estimate the relative "volume" of each category of broadcast television programming that cable system operators retransmitted during the 2010-13 period pursuant to the Section 111 statutory license. Table 2 purported to show the relative "distant viewing" of those program categories during the same period. The Wecker Report concluded that Dr. Gray's Table 1 estimates did not accurately measure "the volume of programming purchased by CSOs" and Dr. Gray's Table 2 estimates of "distant viewing" were unreliable and invalid.

The Amended Wecker Testimony and Report address the 2018 Gray Testimony. They explain that Dr. Gray's correction of his underlying WGNA dataset and his revised methodology result in a five percent reduction to Program Suppliers' estimated "distant viewing" share; however, had Dr. Gray replaced the WGNA dataset without making any additional methodological changes, Program Suppliers' share of estimated "distant viewing" would have

been reduced by more than eleven percent. More fundamentally, they conclude that the 2018 Gray Testimony does not fix the most important errors identified in the original Wecker Report, and as a result still yields "volume" estimates that are inaccurate and "distant viewing" estimates that are unreliable and invalid. The Amended Wecker Testimony and Amended Wecker Report are attached as Exhibit A, and a redlined copy identifying changes to the Wecker Testimony and Wecker Report are attached as Exhibit B.

Susan Nathan's original written rebuttal testimony also addressed the 2017 Gray Testimony. She explained that Dr. Gray's estimates of "distant viewing" were unreliable and invalid because they relied solely upon data from The Nielsen Company's National People Meter ("NPM") service, which is designed to measure only nationwide viewing for nationally televised program, and because they failed to account for the fact that Nielsen assigns different weights to each of the households in the NPM sample, and instead improperly treated each NPM household as having the same weight. She also explained that Dr. Gray's underlying documents omitted substantial NPM data for WGNA, the largest distantly transmitted station.

The Amended and Corrected Written Rebuttal Testimony of Susan Nathan addresses the 2018 Gray Testimony. As Ms. Nathan explains, Dr. Gray now acknowledges that his original testimony omitted substantial NPM data for WGNA. She further explains that the 2018 Gray Testimony still inappropriately relies on the Nielsen NPM data, which cannot be used to measure "distant viewing," and that Dr. Gray only exacerbates the problems associated with relying on the NPM data by applying the Nielsen NPM weights, which lead to implausible and unreliable results. Ms. Nathan's amended and corrected testimony is attached as Exhibit C, and a redlined copy identifying her changes is attached as Exhibit D.

Finally, a section of Dr. Israel's original written rebuttal testimony addressed the 2017 Gray Testimony. Dr. Israel explained that neither of Dr. Gray's metrics — volume or viewing — provides an economically valid measure of the relative fair market value of the program categories. In his Amended Written Rebuttal Testimony, Dr. Israel updates this portion of his testimony to account for the revised volume and viewing statistics reported in the 2018 Gray Testimony and its underlying documents. Dr. Israel's conclusion that Dr. Gray's metrics are not economically valid measures of fair market value remains unchanged. Dr. Israel's amended testimony is attached as Exhibit E, and a redlined copy identifying his changes is attached as Exhibit F.

JSC's Written Rebuttal Statement memorandum and the remainder of JSC's Corrected Written Rebuttal Testimony filed on October 5, 2017 remain unchanged, as do JSC's proposed allocation shares for 2010-2013.

Respectfully submitted,

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I hereby certify that on this 12th day of February, 2018, a copy of the foregoing AMENDED AND CORRECTED WRITTEN REBUTTAL TESTIMONY OF THE JOINT SPORTS CLAIMANTS was filed electronically using eCRB, which will automatically provide electronic service copies to all counsel of record who are registered to use eCRB. *See* 37 C.F.R. § 350.6(h)(1). Additionally, an electronic copy of this filing has been sent via email to the counsel listed below.

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EXHIBIT A

Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

	)	
In re	)	
	)	
DISTRIBUTION OF CABLE ROYALTY FUNDS	)	**NO. 14-CRB-0010-CD (2010-13)**
	)	
	)	

Written Rebuttal Testimony of

DR. WILLIAM E. WECKER AND R. GARRISON HARVEY

September 15, 2017

Amended February 12, 2018

I. QUALIFICATIONS

Dr. William E. Wecker

I am a statistician and applied mathematician. I received the Bachelor of Science degree (Basic Sciences) from the United States Air Force Academy. I received both the Master of Science degree (Operations Research) and Doctor of Philosophy degree (Statistics and Management Science) from the University of Michigan. I have served on the faculties of the University of Chicago, the University of California, Davis, and Stanford University where I taught statistics and applied mathematics at the graduate level. I have performed research in statistical theory, statistical methods, and applied mathematics for over four decades.

I am currently President of William E. Wecker Associates, Inc., an applied mathematics consulting firm located in Jackson, Wyoming. I am a member of the American Statistical Association, the Institute of Mathematical Statistics, and the Society for Risk Analysis. I have served as associate editor of the Journal of the American Statistical Association for four years and of the Journal of Business and Economic Statistics for eighteen years. A copy of my curriculum vitae is attached in Appendix A.

R. Garrison Harvey

I am a statistician and applied mathematician. I received the Bachelor of Science degree (Applied Mathematics) from the United States Air Force Academy and the Master of Science degree (Operations Research) from the Air Force Institute of Technology. I am currently Vice President and Principal Consultant at William E. Wecker Associates, Inc. I devote much of my practice to understanding and evaluating complex datasets and performing complex statistical analyses, including multiple regressions. I have served as an expert witness in litigation and arbitration in matters evaluating damages, breach of contract, copyright infringement, consumer

product performance, epidemiology, sample design, credit card market analysis and profitability, statistical analysis of credit card industry data, and class certification. Additionally, I have worked as a consultant on many litigations and business consulting engagements including: antitrust matters involving price-fixing; false advertising; unfair competition and monopolization; consumer product safety and performance; environmental damage; class actions alleging disparate impact in insurance; insurance claims; lending and wages; patent and intellectual property matters involving pharmaceutical drugs, petrochemical formulation, and automobile devices. These qualifications and a list of my professional publications are in my curriculum vitae attached as Appendix B.

II. Purpose of Testimony

The Joint Sports Claimants initially requested William E. Wecker Associates, Inc. to review the Corrected Testimony Jeffrey S. Gray, Ph.D., which he submitted in this proceeding on April 3, 2017 ("2017 Gray Testimony") . Our objective was to determine how Dr. Gray arrived at the estimates in Table 1 and Table 2 of that testimony and whether the data, approaches, and analyses underlying his testimony supported those estimates. Table 1 purports to show the relative "volume" of different categories of broadcast television programming that cable system operators (CSOs) retransmitted during the years 2010 through 2013 pursuant to the Section 111 statutory license. Table 2 purports to show the relative "distant viewing" of those program categories during the same years.

A copy of our report analyzing the 2017 Gray Testimony was filed with the Copyright Royalty Judges on September 15, 2017. Based upon our analysis of Dr. Gray's testimony and underlying data and for the reasons explained in our report, we concluded that: (1) Dr. Gray's Table 1 estimates do not accurately reflect "the volume of programming purchased by the

CSOs," as Dr. Gray claims; and (2) Dr. Gray's Table 2 estimates of "distant viewing" are unreliable and invalid. Among other things, we explained that Dr. Gray's analysis was based upon inaccurate data.

On January 22, 2018 Dr. Gray submitted a corrected version of his 2017 Testimony ("2018 Gray Testimony"). He acknowledges that his earlier testimony was based upon inaccurate data and purports to substitute new data that respond in part to the concerns we raised. Dr. Gray also changes his methodology in two significant respects. For the first time, he applies Nielsen National People Meter weights to estimate "distant viewing." He also uses two separate regressions rather than a single regression to estimate that viewing. These changes result in changes in Dr. Gray's Table 1 "volume" estimates and Table 2 "distant viewing" estimates.

Attached is an amended version of our prior report addressing the 2018 Gray Testimony. Based upon our analysis of Dr. Gray's corrected testimony and underlying data and for the reasons explained in our amended report, we continue to believe that: (1) Dr. Gray's Table 1 estimates do not accurately reflect "the volume of programming purchased by the CSOs," as Dr. Gray claims; and (2) Dr. Gray's Table 2 estimates of "distant viewing" are unreliable and invalid. We also continue to believe that Dr. Gray's analysis is based upon inaccurate data.

We declare under penalty of perjury that the foregoing is true and correct.

Executed on February 9, 2018.

William E. Wecker, Ph.D.

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ANALYSIS OF

WRITTEN DIRECT TESTIMONY OF JEFFREY S. GRAY, PH.D.

IN THE 2010-13 CABLE ROYALTY DISTRIBUTION PROCEEDING BEFORE THE COPYRIGHT ROYALTY JUDGES

By

William E. Wecker, Ph.D.
R. Garrison Harvey

September 15, 2017

Amended February 12, 2018

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I. INTRODUCTION AND SUMMARY

1. We understand that Section 111 of the Copyright Act grants cable system operators ("CSOs") a "statutory license" to retransmit the copyrighted programming on out-of-market (distant) broadcast television stations. To qualify for this license, the CSOs must pay statutorily-prescribed royalty fees, which are collected by the U.S. Copyright Office. The Copyright Royalty Judges ("Judges") allocate the Section 111 royalties among claimant groups that represent different categories of retransmitted programming, as identified in the Judges' November 25, 2015 order in this proceeding ("Agreed Categories").[1] We further understand that in allocating royalties, the Judges employ a relative market value standard, *i.e.,* they seek to determine what the CSOs would have paid, on a relative basis, for each of the Agreed Categories in a free market with no statutory license.

2. In the proceeding to allocate the 2010-13 cable royalties, Jeffrey S. Gray, President of Analytics Research Group, LLC, has submitted two versions of his written testimony to the Judges on behalf of one of the claimant groups, Program Suppliers. Dr. Gray submitted the first version of his testimony on December 22, 2016, which he corrected on April 3, 2017 ("2017 Gray Testimony").[2] On January 22, 2018, Dr. Gray submitted a corrected version of his 2017 Testimony ("2018 Gray Testimony").[3] The 2018 Gray Testimony is based on a new dataset for WGNA, the most widely-carried distant television station during 2010-13. In addition, the 2018 Gray Testimony reflects a change in methodology. It applies Nielsen National People Meter weights to estimate

[1] The Agreed Categories are Canadian Claimants, Commercial Television ("CTV"), Devotionals, Program Suppliers, Public Television ("PTV"), and Joint Sports Claimants ("JSC").
[2] Testimony of Jeffrey S. Gray, Ph.D. (as corrected April 3, 2017).
[3] Testimony of Jeffrey S. Gray, Ph.D. (as corrected January 22, 2018).

"distant viewing." It also uses two separate regressions rather than a single regression to estimate that viewing — one for WGNA and one for all other stations in the Gray sample.

3. Table 1 of the 2017 Gray Testimony and the 2018 Gray Testimony purports to show the "volume" of programming that CSOs retransmitted during the years 2010 through 2013. Table 2 purports to show the "distant viewing" of that programming. Gray states that his "volume" calculations are "imperfect" measures of relative market value of the Agreed Categories while his "viewership shares correspond to reasonable cable royalty shares" for those program categories. However, the "volume" and "viewership" estimates that Gray provides for non-WGNA stations are within about three percentage points for each of the Agreed Categories, except for the Devotionals category whose "viewership" share is about six percentage points less than its "volume" share. See Table 1 and Table 2

4. The Joint Sports Claimants[4] requested that William E. Wecker Associates, Inc. review the 2017 and 2018 Gray Testimony. Our analysis has determined how Gray arrived at the estimates in his Table 1 and Table 2 and assessed whether the data and methods used by Gray are a valid basis of support for those estimates. While Gray describes the general approach he followed in preparing Tables 1 and 2, he does not describe precisely how he arrived at the Tables 1 and 2 estimates. By examining the computer programs and databases underlying Gray's testimony we were able to determine the details of his calculations, the limitations of the data upon which he relied,

[4] The Joint Sports Claimants are the Office of the Commissioner of Baseball, the National Football League, the National Basketball Association, the Women's National Basketball Association, the National Hockey League and the National Collegiate Athletic Association.

and the several unstated assumptions he made when he analyzed that data in order to arrive at the bottom-line numbers in his Tables 1 and 2.

5. Based upon our analysis of Gray's testimony and underlying data as well as other relevant materials discussed below, we conclude that: (1) the Table 1 estimates in the 2017 Gray Testimony and 2018 Gray Testimony do not accurately reflect "the volume of programming purchased by the CSOs," as Gray claims; and (2) the Table 2 estimates in the 2017 Gray Testimony and 2018 Gray Testimony of "distant viewing" are invalid and unreliable. We have corrected Gray's Table 1 calculations — the corrections appear in Table 3 below. However, a correction is not possible for the Gray Table 2 estimates because Table 2 relies upon data that cannot properly be used to measure "distant viewing" and Gray's regression techniques do not resolve the underlying issues with the data.

II. GRAY STATES THAT HIS "VIEWERSHIP" ESTIMATES PROVIDE A BETTER MEASURE OF RELATIVE MARKET VALUE THAN HIS "VOLUME" ESTIMATES: HIS ESTIMATES REFLECT A DIFFERENCE OF BETWEEN 0.6 PERCENAGE POINTS AND 7.5 PERCENTAGE POINTS FOR EACH CATEGORY

6. Relying upon data provided by Cable Data Corporation ("CDC") and Gracenote, Inc.[5] ("Gracenote") as well as an algorithm he devised, Gray estimates what he describes as the "volume of programming purchased by the CSOs" during 2010-13 and each of the Agreed Categories' shares of that "volume." He reports his estimates in Gray Table 1, "Levels and Shares of Retransmissions and Volume by Royalty Year."[6,7] Gray states that these estimates of "total volume of minutes of programming

[5] Gray also uses Canadian data from the Canadian Radio-television and Telecommunications Commission("CRTC").
[6] Unless otherwise stated, all cites to "Gray Testimony" apply to both his 2017 and 2018 Testimony.
[7] Gray Testimony, ¶32.

retransmitted by CSOs effectively represents the volume of programming purchased by the CSOs" and that "program volume provides useful information concerning the relative value of programming to CSOs . . . ."[8] According to Gray, the volume of programming retransmitted "provides an imperfect metric" of relative market value of the Agreed Categories.[9]

7. Gray then states that "viewership" estimates of "[a]udience size, which is determined through program viewership, is . . . the most direct measure of a program's relative value" and that "the share of viewing minutes provides a superior measure of relative value."[10] Gray describes his Table 2 estimates as the relative "viewership" during 2010-13 of each of the Agreed Categories using the data and algorithm noted above as well as data provided by The Nielsen Company ("Nielsen") and his own statistical analysis of that data. He reports the results of his analysis in Gray Table 2, entitled "Distant Viewing Levels and Shares by Royalty Year."[11] According to Gray, the "viewership" shares in his Table 2 "correspond to reasonable cable royalty shares" and he urges the Judges to allocate the 2013 cable royalty funds according to those shares.[12]

8. Gray distinguishes between the relevance of "volume" estimates and "viewership" estimates. As shown in Table 1 and Table 2 below, his estimates of those two metrics in his 2017 Testimony and 2018 Testimony reflect a difference of between 0.6 percentage points and 7.5 percentage points.

---

[8] Gray Testimony, ¶¶17 & 18.
[9] Gray Testimony, ¶34; *see also* Gray Testimony, ¶22 ("relative volume of programming by claimant category . . . provides good, but imperfect, indicators of the relative value of the sets of programming at issue in this proceeding.").
[10] Gray Testimony, ¶¶19 & 34.
[11] Gray Testimony, ¶38.
[12] Gray Testimony, ¶38.

Table 1: 2010-13 Volume v. Viewership Shares
(2017 Gray Testimony)

Agreed Category	2010-13 Avg. Volume Share	2010-13 Avg. Viewership Share	Difference
Canadian Claimants	1.1%	3.7%	2.6%
CTV	14.3%	13.5%	0.8%
Devotionals	7.9%	1.4%	6.4%
Program Suppliers	48.4%	45.5%	2.8%
PTV	27.7%	33.0%	5.3%
JSC	0.6%	2.9%	2.2%

Table 2: 2010-13 Volume v. Viewership Shares
(2018 Gray Testimony)

	All data			WGN			All non-WGN data		
	2010-13 Avg. Gray Volume Share	2010-13 Avg. Gray Viewership Share	Difference	2010-13 Avg. Gray Volume Share	2010-13 Avg. Gray Viewership Share	Difference	2010-13 Avg. Gray Volume Share	2010-13 Avg. Gray Viewership Share	Difference
can	1.1%	3.0%	2.0%				1.1%	3.5%	2.4%
com	14.3%	20.7%	6.3%	57.6%	59.3%	1.7%	14.3%	15.1%	0.7%
dev	7.8%	1.2%	6.6%	3.2%	1.1%	2.1%	7.8%	1.2%	6.6%
ps	48.4%	40.9%	7.5%	17.6%	11.9%	5.6%	48.4%	45.2%	3.1%
public	27.7%	27.1%	0.6%				27.7%	31.1%	3.4%
sports	0.7%	7.1%	6.5%	21.7%	27.7%	6.0%	0.7%	3.9%	3.2%

III. GRAY TABLE 1 SHARE ESTIMATES DO NOT ACCURATELY REFLECT THE VOLUME OF COMPENSABLE DISTANT SIGNAL PROGRAMMING PURCHASED BY CSOS DURING 2010-13

9. We explain below how Gray arrived at his "volume" estimates and why those estimates do not accurately reflect the "volume of programming purchased by CSOs," as Gray claims. In sum, Gray fails to show the number of subscribers to whom the CSOs retransmitted the programming, and he fails to include certain JSC programming. When these errors are corrected, the relative volume shares of each Agreed Category changes by approximately five percentage points or more, with the Program Suppliers' share dropping by approximately 17 percentage points. See Table 3.

A. Gray's Sample Stations

10. The calculations in Gray Table 1 (and Table 2) are based on a stratified random sample of broadcast stations ("Sample Stations"), rather than an analysis of all stations whose signals were retransmitted by CSOs during 2010-13. According to CDC, "Form 3" cable systems (those that paid approximately 97 percent of the 2010-13 cable royalties) retransmitted approximately 1240-1400 broadcast stations each year as distant signals during the period 2010-13. *See* Appendix A, Table A-1. Gray chose a stratified random sample of approximately 150 such stations each year,[13] approximately 11.4 percent of all retransmitted stations. *See* Appendix A, Table A-5. Stratification was based upon the number of cable subscribers who received those signals on a distant basis. For example, there were between 29 and 46 "Stratum 5" stations each year and Gray's sample included all (100%) of these stations. *See* Appendix A, Tables A-1, A-4. These "Stratum 5" stations reached the most distant subscribers (an average of 1.4 million subscribers per year).[14] *See* Appendix A, Table A-2. There were between 632 and 792 "Stratum 1" stations each year; Gray's sample only included approximately 2.8 percent of these stations. *See* Appendix A, Tables A-1, A-4. These "Stratum 1" stations reached the fewest distant subscribers (an average of 1,808 subscribers per year). *See* Appendix A, Table A-2.

11. Gray does not explain in his written testimony why he used a stratified sample tied to the number of distant subscribers. Presumably he wanted to ensure that his

[13] We are using the term "station" as synonymous with "call sign" as done by Gray in his Appendix B and footnote 22. For example, Gray treats CBUT and CBUT-DT as two stations.
[14] WGNA, a Stratum 5 station, reached by far the most distant subscribers with an average of 42 million distant subscribers. The average number of distant subscribers who received Stratum 5 stations excluding WGNA is 294,070 — this is more than 160 times (=294,070 /1,808) larger than the average distant subscribers of Stratum 1 stations.

volume and viewing calculations accounted for those stations that reached the most subscribers and contributed the most to the cable royalty funds.

B. Gray's Program Categorizations

12. Gray obtained the program schedules for each Sample Station from Gracenote, Inc. and CRTC. He reviewed those schedules to identify "compensable" programs on the stations. We understand that, for purposes of the cable royalty distribution proceedings, "compensable" programs are (1) "non-network" programs, *i.e.*, programs that were not distributed by the ABC, CBS or NBC broadcast networks; and (2) programs that aired on the satellite-delivered WGNA simultaneously with its broadcast by WGN, the local station available off-air in the Chicago market.[15] Based on our review of Gray's database and information provided by Bortz Media & Sports Group, Inc. identifying the compensable WGNA programming**,** Gray failed to include in his calculations many of the compensable Sports telecasts on WGNA (see Appendix O for a list of sports broadcasts missing in the Gray analysis).[16,17] These omissions exist in

[15] Gray Testimony, ¶27.

[16] There were 116, 109, 121, and 116 compensable Sports telecasts (Chicago Cubs, White Sox and Bulls games) on WGNA during 2010-13 respectively (source: "JSC Telecasts on WGNA and FOX.XLSX"). Gray is missing compensable Sports telecasts in each year 2010-13, he only included 114, 104, 55, and 42 on WGNA during 2010-13 respectively (source: "wgn_compensable_cubs_bulls_sox.xlsx"). In the Lindstrom dataset used in the 2017 Gray Testimony, very few of the compensable Sports telecasts identified by Gray have any reported distant viewing (see Appendices C and D). However, those Sports telecasts had substantial viewing according to the dataset used in connection with the 2018 Testimony as well as the data provided by Nielsen to Major League Baseball. See ¶26 below.

[17] Gray assigned each compensable program to one of the Agreed Categories using an algorithm he devised as well as manual reviews of the programming [Gray Testimony, ¶27, n.25]. Gray stated that he included all telecasts of Major League Baseball ("MLB") and National Hockey League ("NHL") games on Canadian stations in the Sports category [Gray Testimony, ¶29.]. However, in Gray's 2017 Testimony, based upon our review of his database, we found that Gray failed to include in the Sports category any of the MLB, NHL and National Basketball Association ("NBA") telecasts, and all but two of the National Football League ("NFL") telecasts [only Super Bowl XLVI (2012) and Super Bowl XLVII (2013) are classified as JSC by Gray], on Canadian signals; Gray incorrectly placed all of this Sports programming in the Canadian

Gray's 2018 Testimony as well as his 2017 Testimony notwithstanding that we identified this error in the original version of our report. The result of this Gray error is to understate the "volume" of JSC programming. See Table 3 below.

C. Corrected Gray Table 1 "Volume" Estimates

13. Gray totaled the number of compensable minutes broadcast by the Sample Stations in each of the Agreed Categories for each of the years 2010-13. He then projected his calculations to the entire universe of broadcast television stations retransmitted by CSOs during each of those years using his sample weights. The results of these calculations and projections are set forth in Gray Table 1.[18]

14. Table 1 in both the 2017 Gray Testimony and 2018 Gray Testimony shows that, for example, there were 501,885,381 "Minutes of Retransmissions" in 2010. We know from other data underlying Gray's testimony that CSOs retransmitted 1,239 broadcast television stations on a distant basis in 2010. Thus, Gray Table 1 estimates that, on average, each station contributes approximately 405,073[19] minutes (or equivalently 6,751 [=405,073/60] hours). Gray, therefore, is estimating that the 2010 "volume" equals the total number of minutes of compensable programming broadcast in 2010 by the 1,239 stations retransmitted by CSOs on a distant basis.

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category (i.e., non-JSC category). Gray, therefore, misclassified more than 99% of the more than 25,000 "records" of Canadian sports broadcasts. Gray corrected this error in his 2018 Testimony.

[18] The column labeled "Minutes of Retransmissions" shows the number of minutes of compensable programming by Agreed Category while the column labeled "Share of All Volume" shows each Agreed Category's share of the total number of minutes of compensable programs retransmitted. In addition to the Gray estimate of "volume" of compensable broadcasts minutes, Table 1 also presents estimates of the number of compensable broadcast programs. The column in Gray Table 1 labeled "Retransmissions" reports the number of compensable programs by Agreed Category while the column labeled "Share of All Retransmissions" reports each Agreed Category's share of the total number of compensable programs retransmitted. Gray's Retransmissions calculations treat all programs the same, regardless of the amount of time that they were broadcast, *e.g.*, a 30-minute sitcom is treated the same as a 3-hour MLB telecast.

[19] 405,073 avg. minutes = 501,885,381 minutes /1,239 stations.

15. According to Gray, the "total volume of minutes of programming retransmitted by CSOs effectively represents the volume of programming purchased by the CSOs . . . ."[20] But Gray Table 1, although it also refers to "retransmissions," ignores the number of distant subscribers that actually received the retransmissions. It treats all program broadcast minutes the same across all stations after adjusting for the probability of sampling each station — a minute of programming on WGNA, which reached over 40 million subscribers, is treated the same as station that reached only a few hundred subscribers; WGNA's average share of predicted volume in Gray Table 1 is less than 0.02 percent in 2010, with even lower percentages for the years 2011-2013. Because they fail to account for the number of subscribers to which CSOs made the programs available, the Gray Table 1 estimates do not accurately represent the "volume of programming *purchased by CSOs*" (emphasis added). At best, and placing to one side the errors regarding omissions of compensable JSC games noted above, Gray Table 1 reflects the volume of compensable programming minutes televised by distant signals without regard to the number of CSOs that retransmitted those minutes or the number of distant subscribers to which the signals were retransmitted.[21]

16. In Table 3 below, we have recalculated Gray's Table 1 "volume" share estimates to account for the number of distant subscribers that received the broadcast transmissions as well as including WGNA compensable sports programs excluded by Gray.[22]

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[20] Gray Testimony, ¶17.
[21] Amended Written Rebuttal Testimony of Dr. Mark A. Israel, ¶¶33-36 (amended Feb. 12, 2018).
[22] For example, in our Table 3 for 2013, each minute broadcast on WQAD-DT3 is multiplied by only four distant subscribers while each minute broadcast on WGN-DT is multiplied by 42,522,609 broadcast distant subscribers.

Table 3: Corrected Gray "Volume" Shares[23,24]

Agreed Category	2010	2011	2012	2013	Average 2010-2013
can	3.92%	5.40%	7.27%	7.71%	6.08%
com	19.15%	19.07%	20.28%	18.02%	19.13%
dev	4.30%	2.67%	1.55%	1.70%	2.56%
ps	38.44%	32.56%	26.34%	28.74%	31.52%
public	28.25%	34.36%	38.27%	36.87%	34.44%
sports	5.92%	5.94%	6.29%	6.97%	6.28%

17. In Table 4 below, we compare the average 2010-13 volume shares from Gray's Table 1 estimates to the corrected average 2010-13 volume shares in Table 3 above. As Table 4 reflects, accounting for the number of distant subscribers to which CSOs retransmitted programming in the Agreed Categories during 2010-13 (and missing WGNA compensable sports programs) changes each of the 2010-13 "volume" shares of the Agreed Categories. Among other things, it increases the JSC share by 5.6 percentage points and decreases the Program Suppliers' share by approximately 16.8 percentage points. As this suggests, the JSC programming is broadcast disproportionately by stations that receive greater distant signal carriage while Program Suppliers' programming is broadcast by stations that receive disproportionately less distant carriage.

[23] This table corrects Gray Table 1 to account for the number of distant subscribers that received the broadcast transmissions as well as to correct Gray's errors regarding the exclusion of compensable WGNA JSC programming. Our Table 3 above is weighted using Gray "wgt" variable (*i.e.*, the Gray sampling weight to account for his stratified sample of stations) as done by Gray when he estimated Table 1 and also weighting by distant subscribers (Gray variable AvgTotalDistantSubscribers).

[24] The values in Table 3 above are identical to the values in Table 2 contained in our original report because we correct all the Gray errors in this report and our original report.

Table 4: Comparison of 2010-13 Average Volume Shares:
Gray Table 1 Shares v. Corrected Gray Table 1 Shares

Agreed Category	**2010-13 Avg. Gray Volume Share**	**2010-13 Avg. Gray Volume Share (Corrected)**
Canadian Claimants	1.1%	6.1%
Commercial Television	14.3%	19.1%
Devotionals	7.8%	2.6%
Program Suppliers	48.4%	31.5%
Public Television	27.7%	34.4%
JSC	0.7%	6.3%

IV. GRAY TABLE 2 ESTIMATES OF "DISTANT VIEWING LEVELS AND SHARES" ARE INVALID AND UNRELIABLE

18. We explain below how Dr. Gray arrived at his "viewership" estimates in Table 2 and why those estimates are invalid and unreliable. In sum, Gray's Table 2 does not provide valid and reliable estimates of distant viewership for several reasons, including (i) the audience data upon which Gray relies are not designed to or suitable for measuring distant viewership of his Sample Stations; (ii) in the 2017 Testimony the dataset upon which Gray relies lacks data for 94% of the quarter-hour increments of compensable programming at issue (in the 2018 Testimony the data for WGNA is much more robust but the data for other stations remains similarly spartan); (iii) in his 2017 Testimony Gray used the raw NPM household viewing counts (in the 2018 Testimony Gray uses Nielsen national weights which are unsuitable for regional viewing and thus do not permit reliable estimates of a stations distant viewing)[25]; (iv) Gray's regressions do not fix the other fundamental problems with the Gray data including the 94 percent of the compensable distant viewing records (for all stations in the 2017 Testimony and for non-WGNA stations in the 2018 Testimony) where Lindstrom provided no data; (v) Gray's regressions attempt to predict distant viewership based on its relationship with local

[25] The average Nielsen national weights among single distant viewing households in the Gray data are [redacted] and [redacted] for years 2010 thru 2013 respectively.

viewership, but the data Gray uses are not a reliable estimate of local viewership; (vi) Gray lacks what he calls "local" viewership data for approximately 61 percent of the quarter-hour periods he is attempting to predict; (vii) the unexplained assumptions underlying Gray's regression analysis are problematic in several respects; and (viii) the results in Gray's Table 2 are illogical and improperly marginalize larger stations and overvalue the smaller least carried stations.

A. Lindstrom NPM Data

19. The "viewership" estimates set forth in Gray Table 2 are based at least in part on audience viewing data provided to Gray by Paul Lindstrom who, at the time, worked for Nielsen.[26] Gray refers to the Lindstrom data as "Nielsen Local and Distant Viewing Household Meter Data for 2010-13," which he abbreviates as "Nielsen Household Meter Data."[27] Nielsen uses different samples of metered households to collect audience data,[28] and it is unclear from Gray's written testimony alone which of the multiple, different Nielsen samples was the source of data provided by Lindstrom and utilized by Gray in making his Table 2 predictions. However, the Program Suppliers have advised JSC that Gray used data taken solely from a subset of Nielsen's National People Meter ("NPM") household sample.[29]

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[26] We say "at least in part" because the 2018 Testimony does not identify the source of the updated WGNA data, and the Program Suppliers have not submitted testimony explaining the source or background concerning the updated WGNA data.
[27] Gray Testimony, ¶25.
[28] Amended Written Rebuttal Testimony of Susan Nathan (February 12, 2018) ("Nathan Testimony"), pp. 4-7.
[29] April 12, 2017 Letter From Counsel for Program Suppliers to Counsel for JSC. Gray's use of data from the NPM sample is problematic because Nielsen did not design the NPM sample to produce audience estimates of local or distant viewing of programs televised by individual broadcast stations. Rather, Nielsen designed the NPM sample to estimate nationwide viewing of nationally televised programs. Thus, Gray inappropriately sought to employ the NPM sample for purposes that the sample simply was not designed. *See* Nathan Testimony, pp. 8-10 ("In the First

20. Lindstrom says that he "designed custom analyses of national household metered viewing data" for Gray.[30] These analyses were "custom" in the sense that Lindstrom provided Gray with what he says was a subset of 2010-13 NPM data — data concerning viewership by NPM cable households of programming broadcast by the Sample Stations during 2010-13. Lindstrom divided the households into those located within counties that Program Suppliers identified as "local" to each station and those located outside those counties ("distant households").[31]

21. Based upon information he received from Gracenote and the CRTC, Gray identified 17.4 million quarter-hour segments ("records") in 2010-13 across all Sample Stations where compensable programming was to distant households. Gray sought NPM distant and local viewing information for each of these 17.4 million records. However, the dataset Gray received from Lindstrom and used in the 2017 Testimony contains no data whatsoever for approximately 16.4 million (94%) of the 17.4 million quarter-hour

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Version, Dr. Gray erred by using the raw count of NPM households without applying any weighting to account for how those households relate to the particular distant signal markets he analyzed. In the Second Version, Dr. Gray errs by applying Nielsen's national NPM weights, which are meant to project the NPM households to represent nationwide viewing levels and cannot reliably project the NPM households to distant viewing levels in particular markets.")

[30] Testimony of Paul B. Lindstrom, p. 4 (dated December 12, 2016) ("Lindstrom Testimony").

[31] Lindstrom Testimony, pp. 4-5. Lindstrom says that "[w]here the viewing minutes to particular distant signal programs were so small as to be statistically insignificant, Nielsen's custom analysis would assign a zero viewing value." Lindstrom Testimony, p. 5. Lindstrom does not identify in his dataset what data Nielsen changed to a zero value, or what rules he used to determine when to make such modifications to the data. He has provided no documentation or details regarding this data manipulation. Mr. Lindstrom's explanation that the data was changed to a "zero viewing value" when the actual values "were so small as to be statistically insignificant" is not a valid basis for making the changes he made. There is no statistical principle stating that small or "statistically insignificant" observations should be changed to zero. Even if there were such a principle, which there is not, Mr. Lindstrom does not explain which data was "statistically insignificant", or how he determined that certain data were "statistically insignificant." We understand that Program Suppliers provided no documents or data that would explain which data values were changed to zero and what principles and methods were used to determine which data to change, but merely stated that Mr. Lindstrom "relied on his knowledge and experience" and that there are no underlying documents regarding this element of his testimony.

records for which Gray sought distant viewing data.[32] While Gray does not report those numbers in his written testimony, he does say that "there are many instances of no recorded distant viewing of compensable retransmitted programs" in the NPM data he received.[33]

22. In those rare instances (less than 6 percent) where the 2017 Lindstrom dataset contains data about viewership for a given program, the data are limited. Within this 6 percent slice of the quarter-hour records, fully 84 percent [=4.95%/(100%-94.1%)] of the records reflect distant viewing by only a single household. As Table 5 below shows, each of 860,608 (4.94%) quarter-hour segments on the Sample Stations generated distant viewing (for some or all of the quarter-hour) by only one NPM household during 2010-13; 128,308 (0.74%) quarter-hour segments generated distant viewing by two NPM households during that period; and so forth. Of all 1,027,281 records (6 percent of all records) with any data on viewing during 2010-13, there were only 34 quarter-hour segments that attracted more than 10 distant NPM households. Only 0.96 percent of all compensable viewing records report 2 or more distant viewing households.

[32] *See* Table 4 and Appendix B.
[33] Gray Testimony, ¶35.

Table 5: Distant Viewing Household Counts (Unweighted) for all 17.4 Million Compensable Records in the 2017 Lindstrom Data (used in 2017 Gray in Testimony)[34]

Distant Viewing Households	Overall 2010-13 Record Count	%
No Data	16,387,655	94.10%
1	860,608	4.94%
2	128,308	0.74%
3	27,273	0.16%
4	7,083	0.04%
5	2,342	0.01%
6	931	0.01%
7	394	0.00%
8	195	0.00%
9	71	0.00%
10	42	0.00%
11	17	0.00%
12	8	0.00%
13	3	0.00%
14	3	0.00%
36	1	0.00%
39	1	0.00%
43	1	0.00%
Total:	**17,414,936**	**100%**

23. The absence of data in the 2017 Lindstrom dataset, upon which Gray relies in his 2017 Testimony, is particularly stark for WGNA. Although WGNA reached over 40 million cable households each year on a distant basis,[35] the Lindstrom dataset used in Gray's 2017 Testimony shows [redacted] that watched only [redacted] of distant viewing in 2013 (the [redacted] of viewing was for a [redacted].[36] The Lindstrom dataset used in Gray's 2017 Testimony

[34] As explained in ¶21 above, Gray breaks compensable distant programing into records made up of quarter-hour segments. See Appendix B for by year details.
[35] Gray Testimony, Appendix E.
[36] Appendix C contains the full set of 2010-13 NPM data that Gray received from Lindstrom and used in his 2017 Testimony for all compensable programming on WGNA. Appendix D indicates how Gray coded that data to show the particular programs on WGNA. Note that if any NPM household recorded viewing to any portion of any quarter-hour, Gray considered that household as viewing the entire quarter-hour for purposes of his calculations. Thus, Gray counts this one minute of viewing of WGNA during 2013 as 15 minutes of viewing for purposes of his regression analysis and his Table 2 estimates.

contains no other data about any of the other programs broadcast on WGNA in 2013. The Lindstrom dataset used in Gray's 2017 Testimony regarding WGNA is similarly sparse for the years 2010-2012. In 2010, the Lindstrom dataset used in the Gray 2017 Testimony shows that there were a total of only [redacted] quarter-hour program segments [redacted] on WGNA viewed by any NPM cable households on a distant basis. The comparable numbers of distantly viewing households in 2011 and 2012 were [redacted] quarter-hours [redacted] and [redacted] quarter-hours [redacted], respectively. In no instance do the Lindstrom data used in the Gray 2017 Testimony report more than [redacted] watching any program on WGNA during any quarter-hour in 2010-13. *See* Appendices C & D.

24. The data Lindstrom provided Gray for WGNA and used in the 2017 Testimony also contrast with the data he provided Gray for other Sample Stations. For example, Appendix D[37] shows the 21 quarter-hour segments on WGNA that attracted distant viewing in 2010 according to the Lindstrom data. The comparable number for KTNC-DT, which reached less than one percent of the distant subscribers reached by WGNA, is 18,988, suggesting that distant viewership of KTNC in 2010 was 900 times greater than that of WGNA.[38]

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[37] The Non-WGNA station data is the same in Gray's 2017 and 2018 Testimony. Appendix B reports the data for the new WGNA data as well as the data for non-WGNA stations (same data in 2017 and 2018 Gray data)

[38] The Lindstrom data used in the 2017 Testimony reflect several anomalous results. For example, according to that data, the most viewed distant program during the year 2013, with [redacted] NPM households, was a one quarter-hour segment of the "[redacted]," broadcast by the Atlanta ABC affiliated station WSB-DT. According to Gray, WSB-DT reached approximately 100,000 distant subscribers (about 0.2% of the number reached by WGNA). Yet, according to the Lindstrom data used in the 2017 Testimony, this single record had [redacted] times the number of distant viewers than the total distant viewers on WGNA for all of 2013. Similarly, across all 17.5 million Gray records 2010-13, the third most viewed record was for a 15-minute period of a one hour talk show called "The Doctors" broadcast on WSB-DT on Tuesday, October 30, 2012 from 10am to 11am. The Lindstrom data reports there were [redacted] distant viewers for the 10:45am to 11am record for The Doctors, with [redacted] viewers from 10-10:45 am. Thus, according to

25. According to the Lindstrom data used in the Gray 2017 Testimony, of the unique Sample Stations during 2010-13 with any distant viewing data, WGNA ranked 271 out of 312 Sampled Stations in terms of its average distant viewing. See Appendix F which relies on the 2017 Lindstrom data.

26. We also have reviewed a separate NPM report that Nielsen prepared for Major League Baseball ("MLB") showing distant viewing of compensable programming on WGNA during 2010-13.[39] This report shows very different results for WGNA than the custom report prepared by Lindstrom for Gray and used in the 2017 Gray Testimony. Whereas the Lindstrom report used in the 2017 Gray Testimony contains almost no data about viewership of any compensable programming on WGNA during the years at issue, the separate Nielsen/MLB report shows significant viewership of programming on WGNA. See Appendix G.[40] According to the Nielsen/MLB report, on average, [redacted] distant cable households viewed each of [redacted] minutes of JSC programming on WGNA during 2010-13. The comparable numbers for the other Agreed Categories on WGNA

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the Lindstrom data used in the 2017 Testimony, more NPM households viewed some portion of the last 15 minutes of one episode of The Doctors on the morning of October 30, 2012 than viewed all JSC programming on WGNA for all of 2010-13 combined. Gray includes 540 minutes (=36 records X 15 minutes) of distant viewing for this single record of The Doctors in his regression analysis. The Lindstrom data, however, report that these [redacted] households only watched The Doctors for a combined [redacted] minutes (not 540 minutes) — the majority of these [redacted] distantly viewing households only watched The Doctors for [redacted]. The next most watched episode of The Doctors was a broadcast at 2 am on December 14, 2012. According to the Lindstrom Data, [redacted] households distantly viewed some portion of a single 15-minutes period of this show but there was no distant viewing of the other 45 minutes of the show. Gray includes 45 minutes (=3 records X 15 minutes) of distant viewing for this single record of The Doctors in his regression analysis. The Lindstrom data report that these [redacted] households only watched The Doctors for a combined [redacted] minutes (not 45 minutes) — each household only watched [redacted] minute of the one-hour program.

[39] This dataset excludes viewing in those counties that would be deemed local for purposes of Section 111.

[40] Appendix G identifies in the column labeled "MC US AA Proj (units)" the number of distant cable households that Nielsen estimated as watching each of the compensable programs on WGNA during 2010-213. The column labeled "Total Duration" shows the number of minutes each program aired.

were [redacted] households for each of [redacted] compensable minutes (Commercial Television) and [redacted] households for each of [redacted] minutes (Program Suppliers). See **Table 6**.

Table 6: Distant Viewing of WGNA Compensable Programming (2010-13) Using Nielsen/MLB Data [41]

	JSC	Commercial Television	Program Suppliers
Distant Viewing Compensable Minutes	[redacted]	[redacted]	[redacted]
Distant Average Household Viewing per Compensable Minute	[redacted]	[redacted]	[redacted]

27. The distantly viewing households in the Nielsen/MLB data are not directly comparable to the Lindstrom data as reported and used by Gray in his 2017 Testimony. The Nielsen/MLB data report the Nielsen estimated distant cable households that viewed WGNA programming based upon the weighted NPM sample while the Lindstrom data purported to represent viewing by the unweighted (i.e., raw counts) NPM households. But Lindstrom provided no distant viewing data for virtually all of the compensable WGNA programming in the dataset used in the 2017 Testimony. The Nielsen/MLB report shows that there clearly was distant viewing of this programming.[42]

[41] We understand that the Nielsen viewing data for WGNA reflect approximately 92% of the compensable programming on WGNA from 2010-13. WGNA distant viewing data was not available for the 5:30 AM to 8:00 AM time period Monday-Friday, as well as for the periods from 5:30 AM to Noon on Saturday and 5:30 AM to 11:00 AM on Sunday. As such, certain compensable programming including devotional programming, early morning CTV programming and early morning PS programming is not included in Table 5. Written Direct Testimony of James M. Trautman, December 22, 2016, Appendix C.

[42] Lindstrom provided Gray with both weighted and unweighted viewing data. Gray, however, chose to use only unweighted data in his 2017 Testimony; he treated a minute of viewing by one NPM household as equivalent to a minute of viewing by any other NPM household. This was not a proper use of the NPM data. See Nathan Testimony, p. 10.
Indeed, Gray explains that the NPM data he uses "is based on a random sample of people in the United States." Gray Testimony, ¶26. In 2017 Gray, however, errs by analyzing this data as if it were a "simple" random sample when it is not. The NPM service uses a complex stratified random sample and not a simple random sample. This is an important fact that Gray ignores. He

28. On January 22, 2018, Gray submitted the 2018 Testimony. According to a filing by the Program Suppliers, Dr. Gray "discovered that Nielsen viewing data for the distant signal WGNA had not been included in the data set that he had been provided for analysis in the allocation phase of this proceeding, causing the distant viewing shares previously reported in his Amended and Corrected Written Direct Testimony to be incorrect."[43] The WGNA dataset used in Gray's 2017 Testimony contained some minimal data for WGNA.

29. The new data set for WGNA contained in the 2018 Gray Testimony is much more robust than the WGNA dataset used in the 2017 Gray Testimony. Whereas the WGNA dataset used in the 2017 Gray Testimony lacked any data for [redacted] of the records, the new WGNA dataset used in the 2018 Gray Testimony has no data for only [redacted] of the records.

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uses the Nielsen data as if it were a simple random sample where each record had an equal chance of being sampled. The extreme variations in weights are obvious in the data Dr. Gray uses to perform this analysis. Average household weights can differ by a factor of up to [redacted] (and an average of [redacted]). This means that Dr. Gray's assumption (in his 2017 Testimony) that 1 minute of viewing at Household A is equal to one minute of viewing at Household B is incorrect — Household A could represent [redacted] times more viewing than Household B according to the weights in the Lindstrom data. In the 2018 Testimony, Gray applied weights designed for the projection of national audiences. This, too, was improper as, with the exception of WGNA, the distantly retransmitted signals at issue are not national in scope. Application of national weights to regional stations does not allow for reliable predictions of viewing. See Nathan Testimony, p. 10-12.

[43] Third Errata to Amended and Corrected Written Direct Statement and Second Errata to Written Rebuttal Statement Regarding Allocation Methodologies of Program Suppliers, at 1 (Jan. 22, 2018).

Table 7: Distant Viewing Household Counts (Unweighted) for all 17,506 Compensable Records in the Gray WGNA 2017 and 2018 Data

[redacted]

30. In the WGNA dataset used in Gray's 2018 Testimony, distant viewing for WGNA ranges from [redacted] to [redacted] and [redacted] of the records report at least [redacted] households distantly viewing. Across all 17,506 compensable WGNA records, there were more than [redacted] distantly viewing households on average. In the new data set for WGNA, only [redacted] of the records have zero or one distantly viewing household. **Figure 1** shows the number of distantly viewing households (unweighted) for all WGNA records 2010-2013. Given the robustness of the data set, the WGNA data used in the 2018 Gray Testimony appears on its face to permit reliable estimates of distant viewing of WGNA.

Figure 1: Distant Viewing Household Counts (Unweighted) for all Compensable WGNA Records in the Gray Data 2010-2013

[redacted]

31. According to the Gray WGNA data used in his 2018 Testimony, on average, [redacted] distant cable households viewed each of [redacted] minutes of JSC programming on WGNA during 2010-13. The comparable numbers for the other Agreed Categories on WGNA were [redacted] households for each of [redacted] compensable minutes (Commercial Television) and [redacted] households for each of [redacted] minutes (Program Suppliers). See **Table 8**. The Gray WGNA data in **Table 8**, however, understates the JSC share of minutes because it omitted 154 sports programs on WGNA (Appendix O).

Table 8: Distant Viewing of WGNA Compensable Programming (2010-13)
Using Gray 2018 WGNA Data
(Not Including WGNA Sports Programs Excluded by Gray)

	JSC	**Commercial Television**	**Program Suppliers**
Distant Viewing Compensable Minutes	[redacted]	[redacted]	[redacted]
Distant Average Household Viewing per Compensable Minute	[redacted]	[redacted]	[redacted]

32. Unlike the WGNA dataset in the 2018 Gray Testimony, the dataset for other stations in Dr. Gray's sample contains the same problems as were present in the dataset used in the 2017 Gray Testimony. More than 94% of the records for compensable non-WGNA programming contain no data at all. And for the remaining 6%, 4.9% have only data concerning a single household. See **Table 9**.

Table 9: Distant Viewing Household Counts (Unweighted) for all 17.4 Million Compensable Records in the Gray Non-WGNA Data[44]

Distant Viewing Households (unweighted)	Overall 2010-2013	
	Record Count	%
No Data	16,370,171	94.0955%
1	860,572	4.9466%
2	128,303	0.7375%
3	27,272	0.1568%
4	7,083	0.0407%
5	2,342	0.0135%
6	931	0.0054%
7	394	0.0023%
8	195	0.0011%
9	71	0.0004%
10	42	0.0002%
11	17	0.0001%
12	8	0.00005%
13	3	0.00002%
14	3	0.00002%
36	1	0.00001%
39	1	0.00001%
43	1	0.00001%
Total:	**17,397,410**	**100%**

B. Gray's Regression "Techniques"

33. Gray does not base his Table 2 estimates directly on the NPM data provided by Lindstrom. Instead, Gray relied on "multiple regression analysis techniques" that use the Lindstrom data, among other things, as inputs to predict the values reported in his Table 2.[45] Gray devotes a single paragraph of his testimony to identifying those "techniques," stating only that they "calculate the mathematical relationship each year from 2010 to 2013 between distant viewing for a program" (i.e., the dependent variable) and other independent variables, *i.e.,* "(1) a measure of local viewing for the program; (2)

[44] As explained in ¶21 above, Gray breaks compensable distant programing into records made up of quarter-hour segments. See Appendix B for year-by-year details.
[45] Gray Testimony, ¶36.

the total number of distant subscribers of that station; (3) the time of day the program aired by quarter hour; and (4) the type of program aired."[46]

34. Gray used his multiple regression techniques to predict the values on his Table 2 regardless of whether the Lindstrom dataset contained NPM data for a given station. In other words, even where Lindstrom provided Gray with affirmative NPM distant viewing data about a given program, Gray based his prediction of distant viewing on the results of his regression analysis rather than accept the distant viewing data provided by Lindstrom. In his 2017 Testimony Gray used one regression on all data in a particular year but in his 2018 Testimony Gray uses two regressions each year (one regression for WGNA and another for all non-WGNA stations). See paragraph 42 below.

35. There are several problems with Gray's regressions. As an initial matter, the outputs of a regression analysis are only as good as the quality of the input data used by the regression. Gray's regression analyses estimate the relationship between the independent variables and the dependent variable (i.e., distant household viewing). They do not correct deficiencies or errors in the data used by Gray. Thus, while Gray suggests that the use of multiple regression compensates for the sparsity of data in the Lindstrom dataset,[47] the regression analyses do not solve this problem. Gray's regression model cannot compensate for the deficiencies in the underlying data. **Table 10** shows the Gray predictions, based on his regressions, are not much different than the results calculated directly from the Lindstrom dataset. See Appendix H for more details.[48]

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[46] *Id.*
[47] Gray Testimony, ¶¶35-36.
[48] Appendix H compares the results of Gray's regressions versus the NPM data that Lindstrom provided to Gray on a year-to-year basis.

Table 10: Shares of Distant Viewing (2010-13)
Gray Table 2 Predicted vs. Shares Calculated Directly from Lindstrom Data
Non-WGNA Stations

Agreed Category	Gray Table 2 Predicted Shares of Distant Viewing		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)
	All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data	
Canadian Claimants	3.45%	1.28%	0.60%
Commercial Television	15.06%	14.30%	20.56%
Devotionals	1.24%	1.21%	0.43%
Program Suppliers	45.25%	45.03%	43.48%
Public Television	31.09%	34.38%	31.89%
JSC	3.91%	3.80%	3.03%

36. **Table 11** shows the same analysis as **Table 10** but includes Gray's new WGNA data and does not include the WGNA sports broadcasts that Gray excluded from his analysis.

Table 11: Shares of Distant Viewing (2010-13)
Gray Table 2 Predicted vs. Shares Calculated Directly from Lindstrom Data
All Stations

Agreed Category	Gray Table 2 Predicted Shares of Distant Viewing		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)
	All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data	
Canadian Claimants	3.01%	1.09%	0.50%
Commercial Television	20.66%	20.91%	26.33%
Devotionals	1.23%	1.20%	0.56%
Program Suppliers	40.87%	40.00%	38.62%
Public Television	27.10%	29.25%	26.83%
JSC	7.14%	7.54%	7.15%

37. **Table 12** shows the Gray Table 2 shares for only WGNA — this table shows the actual data, Gray's Table 2 predictions and the predictions when the missing JSC sports are added to WGNA.

Table 12: Gray Table 2 Shares for WGN Only Shares
Actual, Predicted and Corrected (2010-2013)[49]

		Gray Predicted (same as Gray Table 2)		Corrected Predicted (with Missing Sports)	
		distant viewing	share	distant viewing	share
com	[redacted]	2,302,753,245	57.1%	2,302,753,245	50.8%
dev	[redacted]	51,526,872	1.3%	51,526,872	1.1%
ps	[redacted]	499,327,407	12.4%	499,327,407	11.0%
sports	[redacted]	1,175,892,744	29.2%	1,674,973,150	**37.0%**
	[redacted]	**4,029,500,268**	**100%**	**4,528,580,674**	**100%**

Note: multiply by wgt, subshare & share at record level (same as Gray Table 2)

38. In order to execute his regression, Gray had to decide how to address the fact that the Lindstrom dataset lacked viewership data for more than 94 percent of the compensable quarter-hours of programming for non-WGNA stations at issue.[50] Gray does not explain in his written testimony precisely how he did so. However, Gray's approach is evident upon a review of the computer code that he developed. His approach is problematic in several respects.

39. Where the Lindstrom dataset set contained any household viewing data for at least one compensable quarter-hour broadcast (for either distant or local household viewing) for a given station, Gray deemed the data for all quarter-hours of all compensable broadcasts for that station to be complete and then assumed that the absence of data for any given quarter-hour period should be coded as zero viewership. His code instructed the computer to designate any quarter-hour periods with no household viewing data as having zero viewers. For example, **Table 13** shows examples where (i) a given station had tens of thousands of compensable 15 minute periods, (ii) but the data received by Gray did not have any information about distant viewership (or in a few cases only

[49] See Appendix S for the WGNA Table 2 shares for all years 2010 thru 2013.
[50] This same issued applied to the WGNA data in the 2017 Testimony.

had information about 1 single 15 minute period), and (iii) Gray made the assumption that the absence of data meant that no NPM households viewed the 15 minute segment at issue and instructed his computer program to code distant viewing as zero. For example, WTBY had 95,474 distant subscribers in 2011. Gray determined there were 35,036 compensable 15 minute periods of distantly transmitted programming on this station in 2011 (there are about 35,000 15-minute periods in a year). However, Gray only received [redacted] with Nielsen data from Lindstrom. Gray assumed there was no distant viewing for WTBY for all [redacted] records where he had no data and he coded all of these [redacted] records as zero viewing.

Table 13: Gray data examples where there are only zero or one compensable quarter-hour broadcasts

Year	Station	Station City	Total Distant Subscribers	Total Fees Gen	[redacted]
2011	WTBYDT	POUGHKEEPSIE, NY	95,474	215,106	
2012	WTBYDT	POUGHKEEPSIE, NY	93,808	212,888	
2013	WTBYDT	POUGHKEEPSIE, NY	90,729	207,785	
2012	WMBCDT	NEWTON, NJ	89,837	157,148	
2013	WMBCDT	NEWTON, NJ	84,662	151,498	
2013	KCOPDT	LOS ANGELES, CA	74,622	126,320	
2013	KRWGDT	LAS CRUCES, NM	72,293	40,127	
2012	KLCSDT	LOS ANGELES, CA	52,350	25,952	
2011	WYESDT	NEW ORLEANS, LA	46,817	23,652	
2010	WWPXDT	MARTINSBURG, WV	26,583	70,973	
2010	WJEBDT	JACKSONVILLE, FL	24,137	20,000	
2011	KCRGDT	CEDAR RAPIDS, IA	16,382	28,109	
2011	WHAMDT	ROCHESTER, NY	10,443	13,074	
2011	KBFXCA	BAKERSFIELD, CA	10,162	83,686	
2010	KTFTLP	TWIN FALLS, ID	9,658	5,979	
2011	KTFTLP	TWIN FALLS, ID	9,426	6,066	
2013	WBIRDT	KNOXVILLE, TN	8,851	6,903	
2010	KVIADT	EL PASO, TX	8,582	9,320	
2011	KNLJDT	JEFFERSON CITY, MO	6,736	19,801	
2013	WBGHCA	BINGHAMTON, NY	3,347	1,520	

2012	WTWVDT	MEMPHIS, TN	2,176	1,408	[redacted]
2013	WREGDT	MEMPHIS, TN	1,469	932	[redacted]
2011	KWSD	SIOUX FALLS, SD	1,188	1,221	[redacted]
2011	WHTNDT	MURFREESBORO, TN	975	6,807	[redacted]
2010	WBMMDT	TUSKEGEE, AL	895	7,135	[redacted]
2010	KRPVDT	ROSWELL, NM	465	2,360	[redacted]
2010	WFXSDT	WITTENBERG, WI	409	730	[redacted]
2012	KAMRDT	AMARILLO, TX	186	181	[redacted]
2011	WMDTDT	SALISBURY, MD	27	21	[redacted]

40. Gray used approximately 14.5 million quarter-hour records in his regression analysis (he excluded approximately 3 million records that he coded as having missing distant viewing — see ¶42). Among the total 14.5 million records Gray used in his regression analysis, Gray coded approximately 13.4 million (92.9%) compensable quarter-hours, for which he received no viewership data from Lindstrom, as having zero distant household viewing. By choosing to code zero distant viewing for many stations (including large stations such as WTBYDT), Gray created counterintuitive associations within the data where larger stations with large distant subscribers are predicted to have low numbers of viewers. Again, none of this is explained in Gray's testimony.

41. Gray's decision to assume without further evaluation that there should be zero distant viewing households for records in his data when he was provided no Nielsen data is incorrect. For example, Gray coded [redacted] WGNA records as zero in his 2017 Testimony because he was provided no Nielsen data for these WGNA records. However, Gray has now acknowledged that he was wrong. The dataset used by Gray in his 2018 Testimony shows that for all but four of the [redacted] records that Gray previously assumed to have zero NPM household viewers, there were in fact NPM households viewing the programming (and in many instances dozens of NPM households). This calls into question Gray's decision to code more than 14 million records as zero simply because he

did not receive data for the record. Moreover, the case of WGNA shows how sensitive Gray's analysis is to a misassumption. When Gray assumed that the absence of data for WGNA meant that there was no NPM viewership for the records in question, his regression estimated a very small viewership share for WGNA. However, when this assumption was shown to be wrong and more robust viewership data for WGNA was used, the viewership share for WGNA increased by more than 10 times. See **Table 14**. This shows that when a regression relies on unreliable data it will produce unreliable estimates.

Table 14: Gray's Original (2017) Predicted WGNA Distant Viewing vs. New (2018) Predicted WGNA Distant Viewing (based on Gray Table 2)

	Original WGNA Predicted Share of Total Viewing	New WGNA Predicted Share of Total Viewing	Percent Increase in Gray Predicted Shares
2010	1.26%	14.21%	1,028%
2011	0.96%	15.49%	1,518%
2012	0.69%	11.12%	1,520%
2013	1.04%	11.13%	972%

42. Among the stations where the Lindstrom dataset contains no data on distant or local household viewing for a given station, Gray wrote computer code that deemed such data as "missing." Unlike a designation of zero, in this case every quarter-hour period was designated as "missing", and this data was not used in the estimation of the regression analysis. Instead, the regression analysis (based on data with non-missing household viewing) was used to predict the distant household viewing for these records.

Gray coded approximately 3 million quarter-hour periods of compensable programming as "missing" and he predicted the household viewing for these records.[51]

43. There are multiple problems with Gray's use of "local" viewership data in his regressions. Notwithstanding his stated goal of predicting distant viewership based on the relationship between distant viewership and local viewership, Gray did not obtain from Lindstrom data that reliably measures local or distant household viewing for the Gray Sample Stations. Rather, the Nielsen data provided by Lindstrom was taken from the NPM sample, which is designed to estimate national viewership of broadcast programming. We understand that one cannot, as Gray attempts to do, simply isolate the NPM data for given counties and use such data as a proxy for local or distant household viewing. The NPM weighted viewing data are only representative of national, not local, viewing.[52]

44. Furthermore, even if one assumed that the data that Gray calls "local" is in fact a reliable measure of local viewership, the Lindstrom dataset does not contain such "local" data for 10.7 million of the 17.4 million quarter-hour records of compensable programming for which Gray is attempting to predict distant viewing.[53] Thus, Gray is attempting to predict distant viewership based upon the relationship between distant viewership and local viewership, but he lacks data about what he calls local viewership for 61 percent [=10.7 million/17.4 million] of the records underlying Gray Table 2. In the 3 million records that Gray coded as missing local viewing, Gray imputed a value for local viewership by assuming that for each missing record that the local viewing would

[51] These stations with missing distant household viewing include stations in the US, Canada, Puerto Rico, Virgin Islands, and Mexico.
[52] Nathan Testimony, pp. 4-6, 7-11.
[53] Gray codes 7.7 million records as zero and 3 million records as missing.

have been the same as the average local viewing for all programs of the same program type shown during the same "time of day"[54] block on any Sample Station the entire year.

C. Changes Between Gray 2017 Testimony and Gray 2018 Testimony

45. In his 2018 Testimony, Gray corrects two data errors and makes two significant methodological changes that underlie his 2017 Testimony:

- Gray replaces his original erroneous WGNA data with new WGNA data that appears more accurate. However, Gray continues to wrongly exclude from the JSC totals many JSC programs on WGNA, which we identified in our prior report.
- Gray reclassifies as JSC several JSC programs that we previously reported were wrongly classified in the Canadian category in the 2017 Gray Testimony.
- Gray now uses two regressions to predict distant household viewing (one regression for WGN only and another regression for all non-WGN stations) where previously he used only a single regression.[55]
- •He now applies the Nielsen national NPM weights to the raw NPM data provided by Lindstrom to get his estimates of distant viewing for each station; previously he used unweighted data.

46. Gray says he used two regressions in his 2018 Testimony "[d]ue to the large difference between WGN and non-WGN stations in terms of the extent of non-compensable programming, the number of distant subscribers, and the level of distant

[54] Gray defines six "time of day" blocks of varying length.

[55] Dr. Gray's 2017 Testimony included a Poisson regression analysis to analyze the Lindstrom data and to make predictions for particular shows for each Sample Station. In his 2018 Testimony Gray switched from unweighted NPM viewing counts to Nielsen weighted viewing where a single viewing household is projected to represent thousands of nationally viewing households — his change dramatically effected the distribution of the Gray data. Gray used the same Poisson regression analysis in 2018 as he did in 2017 but this choice is not proper. We performed a goodness-of-fit test, using the same software used by Dr. Gray, to determine if the analysis method chosen by Dr. Gray — a Poisson regression — is appropriate to analyze the data and if the analysis method fits the data well. We found that the analysis methodology (*i.e.,* a Poisson regression) is not appropriate and should not be used. There is less than a one in a billon chance that Dr. Gray's analysis is appropriate to use with the Nielsen NPM data Gray uses. For each year 2010-2013 and each regression a Pearson goodness-of-fit test or a deviance goodness-of-fit test the p-value to fifteen decimal places is 0.000000000000000. See Gray_GOF_test.log. Also see, https://www.stata.com/manuals13/rpoissonpostestimation.pdf (Appendix R).

viewing."[56] However, neither the level of compensable programming nor the number of distant subscribers changed when Gray received a new WGNA dataset after discovering his original error. Moreover, the fact that WGNA's level of viewing increased does not explain the need for a separate regression and it does not explain why Gray did not choose to do more regression analysis (i.e., separate regressions per stratum). It is true that WGNA has between 7.4 and 9.3 times more distant viewers than the next largest station but there are many other station with very large differences. See **Table 15**. There are also 21 stations included in his regression analysis that have zero distant viewing but Gray includes these stations in the same regression analyses as stations with over 100,000,000 distant viewing. Dr. Gray provided no scientific basis and no calculation to justify his choice to use two regressions or to support his choice to include all non-WGNA stations in the same single regression.

Table 15: Distant Viewing: WGNA vs. Large Stations
and Large Stations vs. Small Stations

[redacted]

47. Dr. Gray properly corrects the two errors (erroneous WGNA data and missing classified Canadian sports) but he provided no basis that explains why these

[56] Gray 2018 Testimony, ¶36 n.30.

methodological changes were proper or justified. **Table 16** below shows the effect of each one of the changes from his 2017 to his 2018 testimony.

Table 16: 2010-13 Changes from Original to New Gray Table 2[57]

		April 3 2017 Table 2								Jan 22 2018 Table 2	
Distant Viewing		Unwgt NPM counts		Unwgt NPM counts		Nielsen National Weights		Unwgt NPM counts		Nielsen National Weights	
Regressions:		One Regression		One Regression		One Regression		Two Regressions		Two Regressions	
Data changes:		Old WGNA & Canadian Sports Error		New WGNA & Canadian Sports Fix		New WGNA & Canadian Sports Fix		New WGNA & Canadian Sports Fix		New WGNA & Canadian Sports Fix	
		Original 2017		1 Change		2 Changes		2 Changes		New 3 Changes	
		distant viewing	Share	distant viewing	Share	distant viewing	Share	distant viewing	Share	distant viewing	Share
2010-2013	can	137,396	3.50%	161,147	5.13%	1,099,458,193	4.64%	136,027	3.49%	895,171,901	2.91%
	com	541,836	13.79%	682,304	21.70%	5,241,420,913	22.11%	804,253	20.64%	6,394,430,382	20.81%
	dev	57,287	1.46%	45,710	1.45%	348,164,973	1.47%	48,609	1.25%	384,664,450	1.25%
	ps	1,795,147	45.68%	1,079,365	34.34%	8,617,581,202	36.36%	1,474,628	37.85%	12,559,242,457	40.88%
	public	1,290,838	32.85%	912,558	29.03%	6,597,073,702	27.83%	1,128,076	28.96%	8,302,975,190	27.03%
	sports	107,168	2.73%	262,480	8.35%	1,798,966,985	7.59%	304,329	7.81%	2,185,030,405	7.11%
		3,929,672	**100%**	**3,143,564**	**100%**	**23,702,665,968**	**100%**	**3,895,922**	**100%**	**30,721,514,785**	**100%**

48. If Dr. Gray had simply corrected the data errors concerning WGNA and then applied the same methodologies that he applied in his 2017 Testimony, the Program Suppliers would have a share of 34.34%, not the 45.68% reflected in the 2017 Gray Testimony or the 40.88% reflected in the 2018 Gray Testimony. **Table 17** shows that if Gray would have done the same analysis as he did in 2017 but replaced the WGNA data and corrected both of his JSC errors, the Program Suppliers' share would decrease to 33.51% while the JSC share would be 10.55%.

[57] Appendix U contains a breakdown on a year-by-year basis.

Table 17: Correcting Gray Errors and Using Gray 2017 Methodology

		Gray April 3 2017 Original Methodology (3 Errors)		Use Original Methodology Gray Fixed 2 Errors in 2018 Testimony		Use Original Methodology Fixing 3 Errors	
Distant Viewing		Unwgt NPM counts		Unwgt NPM counts		Unwgt NPM counts	
Regressions:		One Regression		One Regression		One Regression	
Data changes:		Old WGNA, Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Include Missing WGNA Sports	
		Original 2017		1 Change (Fix 2 Errors)		1 Change (Fix 3 Errors)	
		distant viewing	Share	distant viewing	Share	distant viewing	Share
2010-2013	can	137,396	3.50%	161,147	5.13%	161,147	5.00%
	com	541,836	13.79%	682,304	21.70%	682,304	21.18%
	dev	57,287	1.46%	45,710	1.45%	45,710	1.42%
	ps	1,795,147	45.68%	1,079,365	34.34%	1,079,365	33.51%
	public	1,290,838	32.85%	912,558	29.03%	912,558	28.33%
	sports	107,168	2.73%	262,480	8.35%	339,697	10.55%
		3,929,672	100%	3,143,564	100%	3,220,781	100%

D. Gray Table 2 "Distant Viewing" Estimates

49. Gray's Table 2 is labeled "Distant Viewing Levels and Shares By Royalty Year." It contains estimates of the "Distant Viewing" and "Share of Distant Viewing" of each of the Agreed Categories for each of the years 2010-13. The column labeled "Distant Viewing" in Gray Table 2 is shown only as a whole number with no corresponding metric. For example, Total Distant Viewing in 2010 is shown as "1,149,455" in the 2017 Gray Testimony and "9,055,929,000" in the 2018 Gray Testimony. According to Gray, Program Suppliers' "Distant Viewing" accounts for 585,521 of the 1,149,455 in the 2017 Gray Testimony and 4,044,541,000 of the 9,055,929,000 in the 2018 Gray Testimony.

50. Gray does not explain what unit of measurement is reflected in the "Distant Viewing" column. The "Distant Viewing" number reflects the number of households that Gray predicts viewed any portion of a quarter-hour of compensable programming that CSOs retransmitted during 2010-13 based on the Lindstrom NPM

sample. The Gray counts of distantly viewing households do not distinguish between one household watching 120 minutes (i.e., eight quarter-hour records) of a program and eight households each watching 1 minute of the same program (i.e., eight total viewing minutes) — in both cases the Gray data would report eight unweighted[58] distantly viewing households even though the actual viewing minutes differ by a factor of 15.

51. As explained above, Gray does not account for what portion of any quarter-hour period that a NPM household actually viewed any given program. Thus, the "Distant Viewing" numbers in Gray Table 2 do not accurately reflect the amount of time that the predicted NPM households spent watching any of the Agreed Program categories. Any of the "Distant Viewing" numbers in Table 2 could be off by a factor of as much as 15.[59]

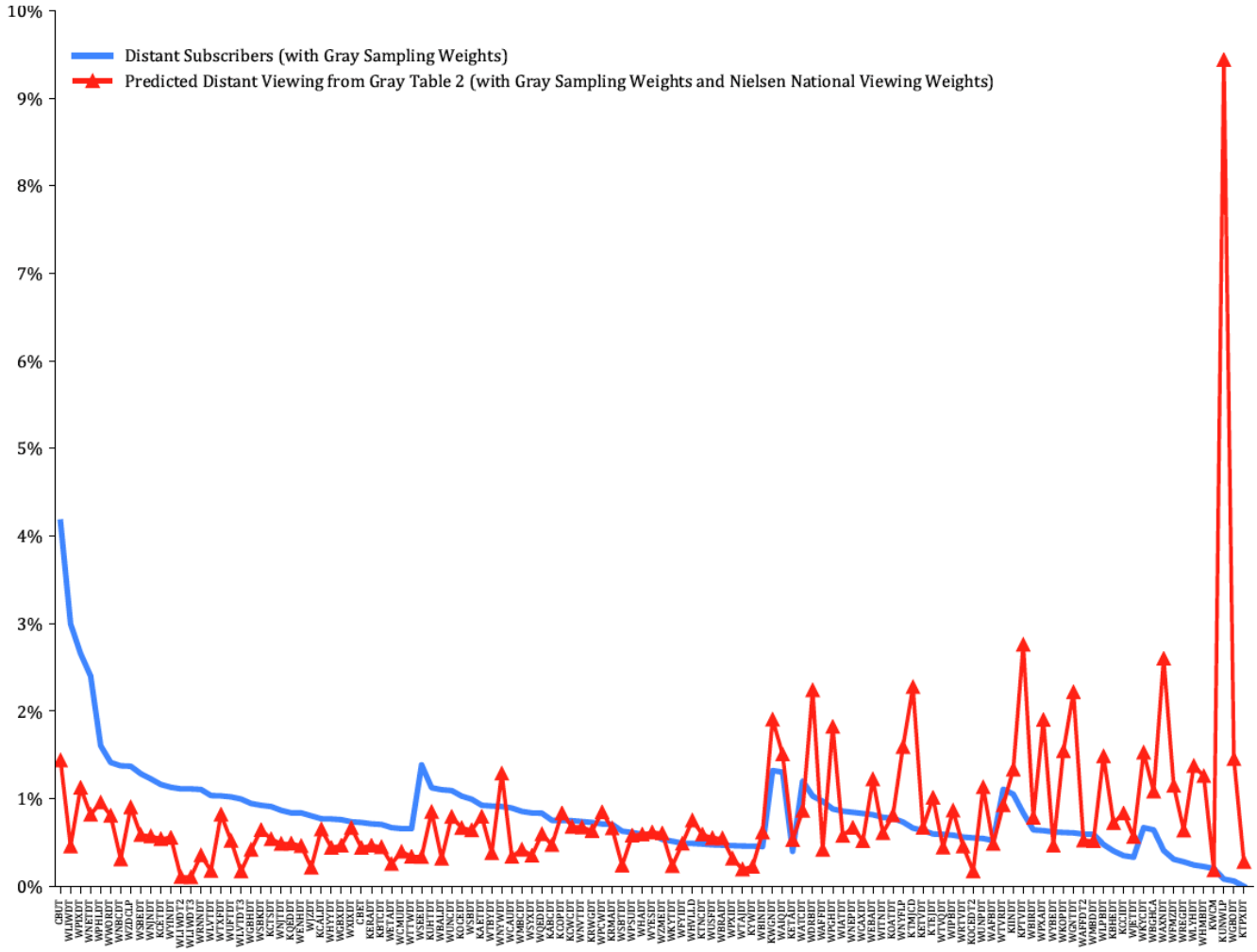
52. Moreover, the estimates in Gray Table 2 in the 2018 Testimony are unreliable because Gray inappropriately uses the Nielsen national weights to inflate his sample estimates of distant viewing. The Nielsen weights are designed to project from an NPM household to a national audience. But with the exception of WGNA, distant signals are not retransmitted on a national basis.[60]

53. Gray's predictions generally understate distant viewing among larger stations and overstate distant viewing among smaller states. This trend can be seen in **Figure 2** below (see Appendix N for figure for all years). For example, the largest station other than WGNA (*i.e.,* CBUT) represents more than 4% of distant subscribers,

[58] Gray then inflates this estimate by using the Nielsen national weights for household viewing.
[59] Gray's regression analysis uses 191.8 billion weighted distant viewing minutes (as Gray coded it from the Lindstrom NPM data). However, the Lindstrom data only reports 115.5 billion weighted viewing minutes. The difference (80 billion minutes) is a function of Gray treating any minute of viewing within a 15-minute period as 15 minutes of viewing.
[60] Nathan Testimony, pp.10-13.

yet Dr. Gray predicts distant viewing of only 1.4 percent.[61] On the other hand, KUNW, one of the smallest stations in the sample represents 0.09 percent of total distant subscribers but Gray predicts that this station represents 9.4 percent of all compensable distant viewing (both the distant subscribers and distant viewing shares include the Gray sampling weights as he uses them in his Table 2).

Figure 2: Share of Gray Predicted Distant Viewing
Compared to Share of Distant Subscribers 2013
Among Non-WGNA Stations



[61] The share of distant subscribers and distant viewing are limited to Gray's non-WGNA analysis and apply the Gray sampling weights he uses to project his Sample Stations to the full population of stations.

54. Gray estimates that the share of distant viewing among stratum 5 stations (the largest station on left of chart) is 56 percent lower than would be expected from their share of distant subscribers.[62] In contrast, Gray estimates that the share of distant viewing among stratum 1 stations (the smallest station on right of chart) is 560 percent larger than would be expected from their share of distant subscribers. Gray estimates demonstrate a similar bias in each year 2010-2013. See **Table 18**.

Table 18: Share of Predicted Distant Viewing Divided by Share of Distant Subscribers by Stratum and Year Among Non-WGNA Stations

	2010	2011	2012	2013	Average
Stratum 1	273%	363%	350%	560%	387%
Stratum 2	71%	58%	177%	86%	98%
Stratum 3	2%	7%	7%	26%	10%
Stratum 4	-18%	-24%	-25%	-22%	-22%
Stratum 5	-46%	-39%	-53%	-56%	-48%

55. In order to determine why Gray's predictions are overstating viewership on smaller stations, we examined the underlying data. A recurring feature among smaller stations is that Gray assumes a level of viewership that is either impossible or implausible given the size of the station. For example, station KUNW (the highest red triangle in **Figure 2**) is a small lower power station with 454 distant subscribers according to the Gray data. With only 454 distant subscribers we know that no more than 454 households could be viewing any particular program on a distant basis. As a test of the reliability of the Gray data we compared the Gray estimates of distant viewing (using the Nielsen NPM weighted estimate) to the 454 distant subscribers. Dr. Gray's data has [redacted] records with non-zero estimates of distant viewing for KUNW for 2013. Among these

[62] The share of distant subscribers is calculated by using the same non-WGNA stations in the Gray analysis and using the Gray sampling weights to project to the full population that Gray used as his sampling frame.

[redacted] records, Gray inputs into his regression between [redacted] and [redacted] distantly viewing households for KUNW despite the fact that there are only 454 distant subscribers. For [redacted] of these KUNW records there was only one unweighted NPM household reporting distantly watching; Gray uses this single NPM household to estimate that there were actually [redacted] households distantly watching when the maximum possible distant viewing could only be 454. **Figure 3** shows all of Dr. Gray's "Actual" Weighted Distant Viewing for KUNW — [redacted] of these records are based on [redacted] NPM households and [redacted] of these records are based on only [redacted].[63] The inflated levels of viewership are driven by Gray's improper use of the Nielsen national NPM weights. As discussed above, those weights are intended to project from a sample home to a national audience, not to an audience of 454. The fact that the weight itself is more than [redacted] times greater than the number of distant subscribers for the station confirms that it is unsuited to be used in the manner that Dr. Gray is applying the weight.

[63] See Appendices I, J, and K for examples of Gray "actual" and predicted distant viewing that are unbelievably large compared to the distant subscribers for this station.

Figure 3: Dr. Gray's "Actual" Weighted Distant Viewing
KUNW 2013: All Nielsen Data (non-zero Gray data)
KUNW had 454 Distant Subscribers and $1,137 Fees Generated

[redacted]

56. The phenomenon where the Gray "actual" distant viewing (based on the Nielsen NPM weighted viewing estimates) is unreasonably large when compared to the number of distant subscribers for a station is not limited to KUNW. Impossibly or implausibly large "actual" distant viewing is very common in the data that Gray uses to make his estimates in Gary Table 2. **Table 19** reports the ratio of the Gray "actual" distant viewing to the number of distant subscribers for every station that is used in the Gray analysis. **Table 19** shows, for example, that every stratum 1 and 2 station has "actual" distant viewing that is larger than the total number of distant subscribers for the stations in 2013. Overall, 22.3 percent of the stations in the Gray data have "actual" distant viewing that is larger than the total number of distant subscribers for the station

and an additional 18.9 percent of the stations have "actual" distant viewing that is more than 50 percent of total number of distant subscribers (this is implausible as even the Super Bowl, the most watched television show, only attracts about 45% of households).[64]

Table 19: Gray Data: Ratio Maximum Distant Viewing /Distant Subscribers

		0-10%	10%-20%	20%-50%	50%-100%	100%+	Total
2010	Stratum 1				1	14	15
	Stratum 2		1	2	6	8	17
	Stratum 3		1	7	14	2	24
	Stratum 4		5	23	9	3	40
	Stratum 5	8	8	6		1	23
	Total 2010	8	15	38	30	28	119
		6.7%	12.6%	31.9%	25.2%	23.5%	100.0%
2011	Stratum 1				1	12	13
	Stratum 2			1	2	11	14
	Stratum 3		1	3	13	1	18
	Stratum 4	4	7	33	5	2	51
	Stratum 5	8	8	6	1		23
	Total 2011	12	16	43	22	26	119
		10.1%	13.4%	36.1%	18.5%	21.8%	100.0%
2012	Stratum 1					13	13
	Stratum 2			2	1	8	11
	Stratum 3				14	3	17
	Stratum 4	2	6	24	12	1	45
	Stratum 5	13	12	9			34
	Total 2012	15	18	35	27	25	120
		12.5%	15.0%	29.2%	22.5%	20.8%	100.0%
2013	Stratum 1					9	9
	Stratum 2					13	13
	Stratum 3			3	10	9	22
	Stratum 4	2	3	17	11	1	34
	Stratum 5	7	18	11			36
	Total 2013	9	21	31	21	32	114
		7.9%	18.4%	27.2%	18.4%	28.1%	100.0%
	Grand Total	42	64	121	73	86	386
		10.9%	16.6%	31.3%	18.9%	22.3%	100.0%

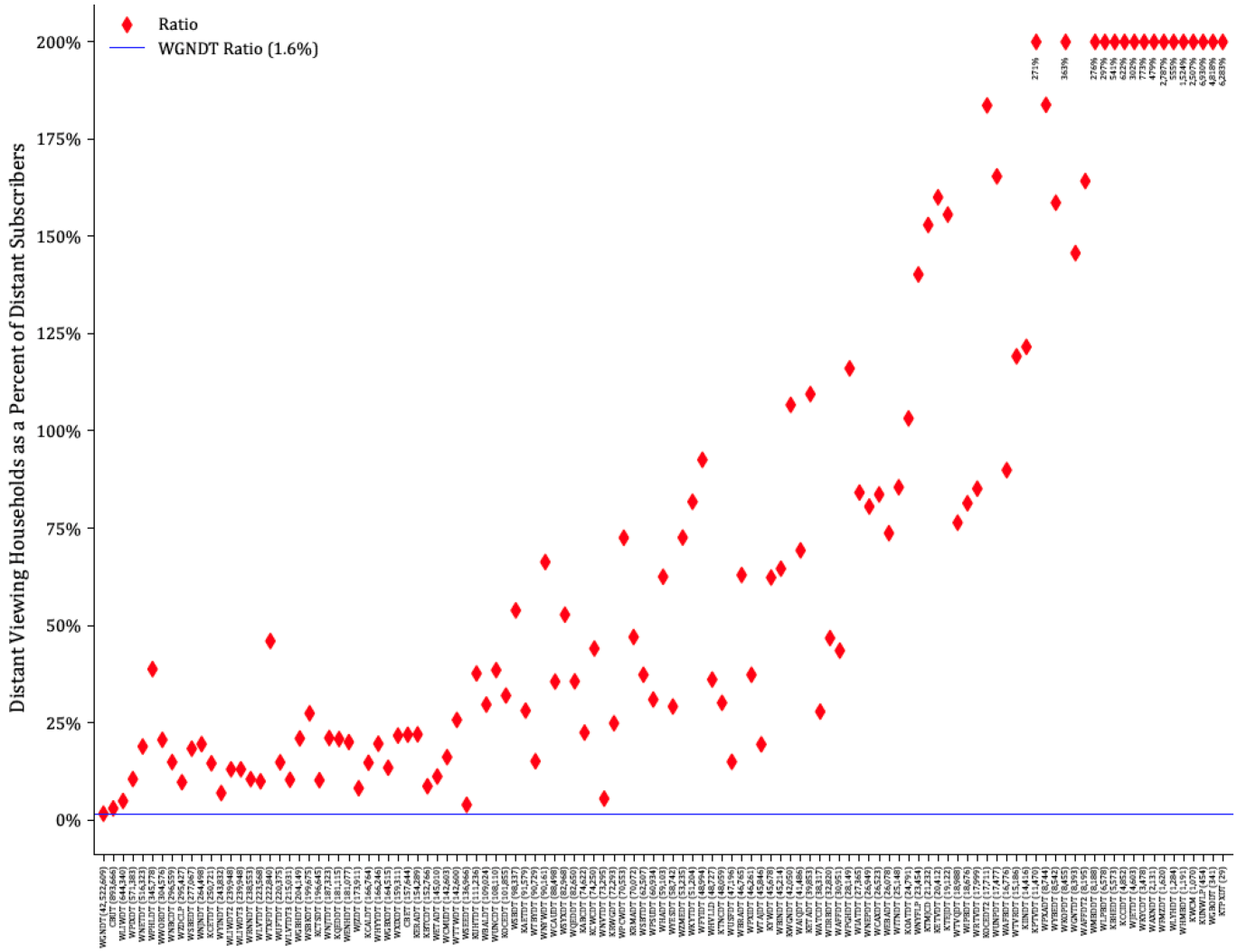
All Gray records with non-zero and non-missing "actual" distant viewing household data
Maximum "actual" distant viewing weighted households as reported in Lindstrom data

[64] Nathan Testimony, p. 12.

57. **Figure 4** shows graphically the ratio of the Gray "actual" distant viewing to the number of distant subscribers by station for every station that is used in the Gray analysis in 2013. This figure is sorted form the largest stations on the left to the smallest stations on the right. **Figure 4** shows that not only is the ratio of distant viewing to distant subscribers not plausible (the Gray "actual" distant viewing for station KTPX is 6,282 percent larger than the number of distant subscribers) but it also shows that the overstatement of distant viewing increased as the size of the station decreases. This is a fundamental problem with the Gray data.[65]

[65] The data used by Gray report "actual" distant viewing for many stations that is not plausible when compared to their distant subscribers. Appendix M shows versions of **Figure 4** for all years 2010-2013.

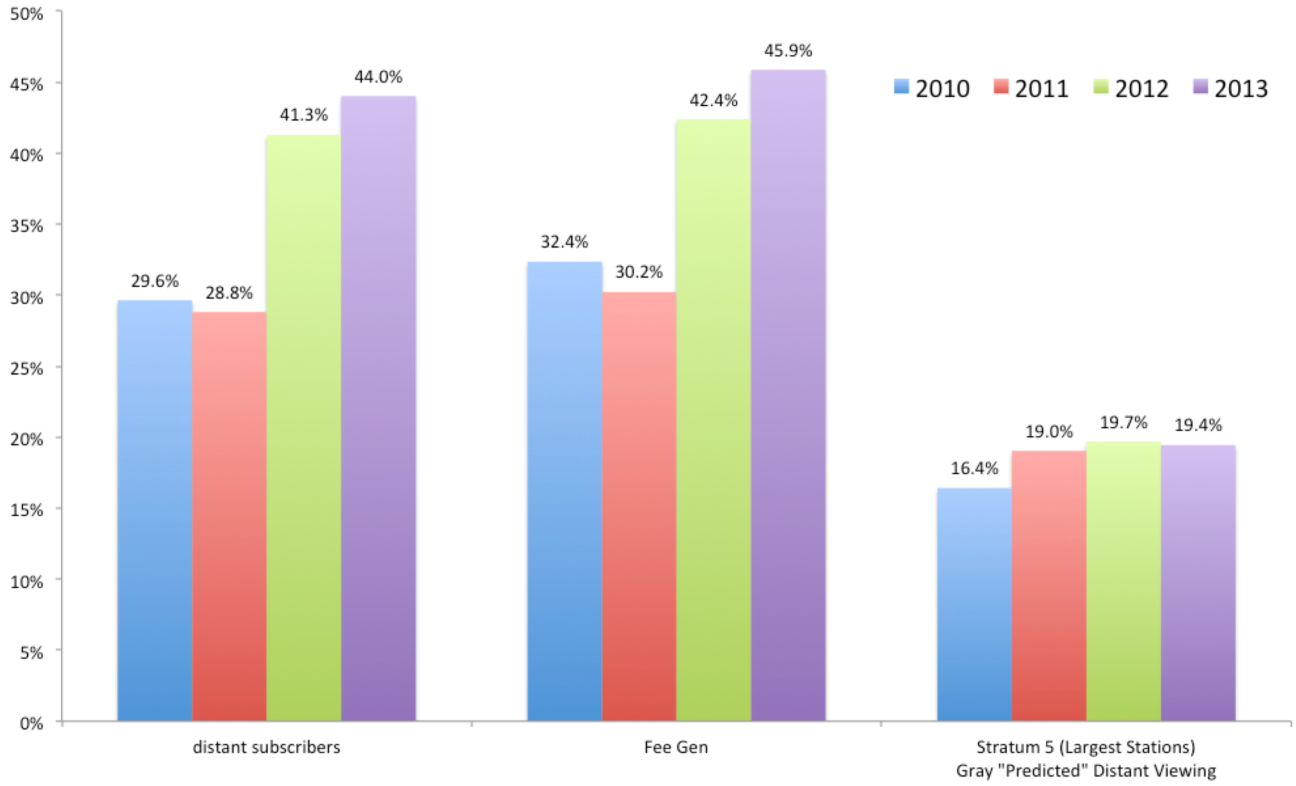
Figure 4: Gray Data: Ratio Maximum Distant Viewing /Distant Subscribers
All Stations used in Gray Analysis in 2013



58. **Figure 4**'s demonstration that Gray greatly overstates the distant viewing of the smaller stations and therefore creates a bias that leads to overstating the importance of distant viewing among the smaller stations and understating the importance of larger stations can also be seen by studying Stratum 5 and Stratum 1 stations specifically. Stratum 5 includes the largest stations by distant subscribership in Gray's sample (29 in 2010, 29 in 2011, 45 in 2012, and 46 in 2013). Appendix A, Table-A1. **Figure 5** shows that these large non-WGNA stations in Stratum 5 had approximately 36 percent of the total distant subscribers and 38 percent of the total fees generated from all non-WGNA

stations in 2010-13. Yet, Gray Table 2 predicts that the compensable programming on the largest non-WGNA Stratum 5 stations account for only approximately 18.6 percent of the 2010-13 distant viewing.

Figure 5: Gray's Prediction For "Stratum 5" Viewing vs. "Stratum 5" Share of Distant Subscribers and Fees Generated Among All Non-WGNA Stations[66]



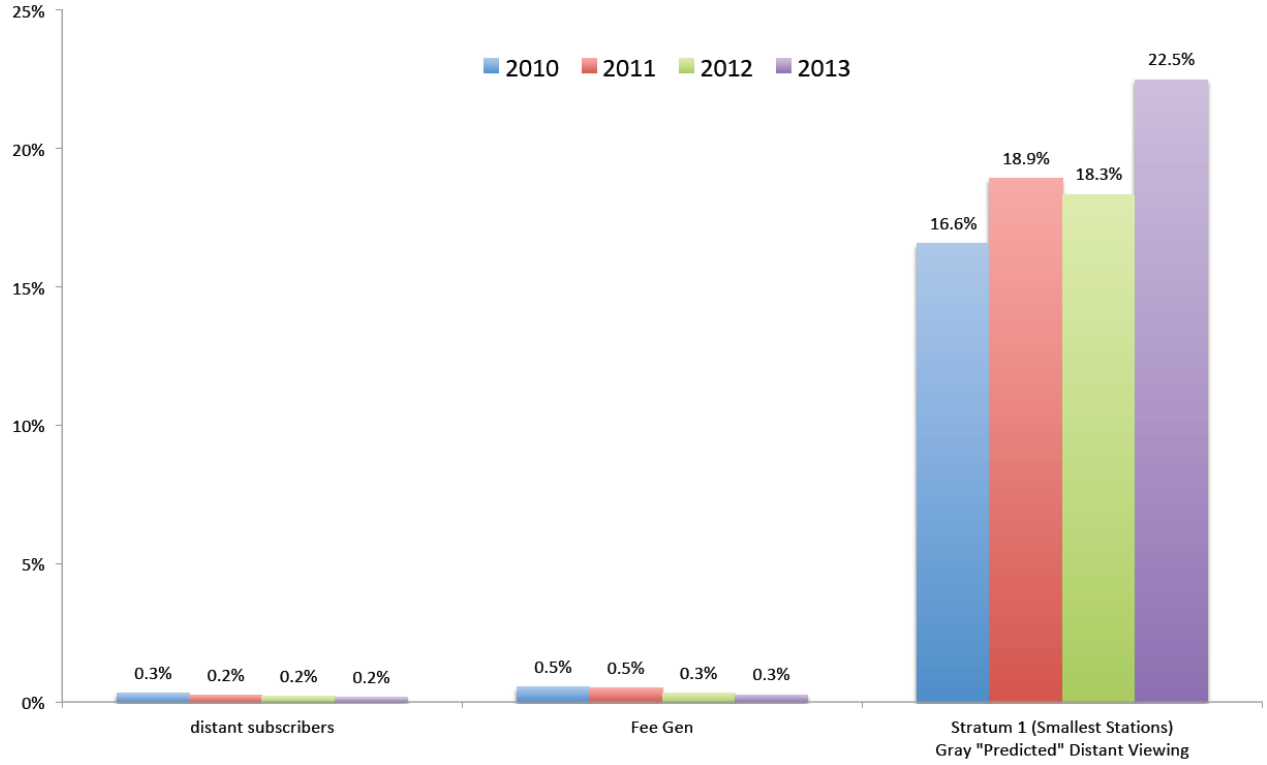
59. Gray's overstatement of viewing on smaller stations leads to illogical outcomes in his Table 2. Gray's Stratum 1 contains the 706 smallest stations (in 2011) with distant subscribers ranging from only *one* distant subscriber to a maximum of 6,464 distant subscribers — these 706 stations average 2,110 distant subscribers per stations.[67]

[66] See Appendix Q.

[67] In 2010, Gray coded 6 stations — WFXS-DT, KRPV-DT, WBMM-DT, KVIA-DT, KTFT-LP, and WWPX-DT—as having zero distant viewers. Individually and cumulatively, these six stations are small with only 46,591 distant subscribers (0.09 percent of the total distant subscribers) and $96,498 fees generated (0.07 percent of the total fees generated). Yet Gray predicts that these 6 stations, when weighted to the entire universe (based on the Gray sampling weights), account for 2.7 percent (3.62 percent in Gray's prior 2017 testimony) of the distant

These small stations in Stratum 1 had only 4.3 percent of the total distant subscribers and only 6.7 percent of the total fees generated from all non-WGNA stations in 2010-2013.[68] However, Gray Table 2 would allocate 19 percent of the cable royalties for on average to these smallest stations 2010-2011. See **Figure 6**.

Figure 6: Gray's Prediction For Stratum 1 Viewing vs. Stratum 1 Share of Distant Subscribers and Fees Generated[69]



60. Similarly illogical are the results in Gray's Table 2 regarding paid programming (or "infomercials"). As shown in **Table 20**, Gray suggests that paid programming on non-WGNA stations was on average nearly as valuable as JSC programming, and in some years even more valuable.

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viewing share in Gray's Table 2 for 2010. Gray therefore predicts that these six stations (with zero distant viewing in the Lindstrom NPM data) have the same share (in Gray Table 2 for 2010) than all of the JSC programming in among non-WGNA stations (i.e., 2.7 percent share for JSC).

[68] Dr. Gray only sampled 21 of these 706 stations in Stratum 1. Dr. Gray uses his predictions for these 21 small stations to estimate the impact of 706 CSOs in Stratum 1.

[69] See Appendix Q.

Table 20: Dr. Gray's Estimated Distant Viewing Shares for Stations
JSC Programming vs. Paid Programming[70]

	All Data		
	JSC Programming	Paid Programming	Paid Programming Divided by JSC
2010	6.88%	3.72%	54.02%
2011	9.16%	3.30%	36.07%
2012	5.35%	2.67%	49.91%
2013	7.16%	2.47%	34.56%
Average	**7.14%**	**3.04%**	**43.64%**

	Non-WGN Data		
	JSC Programming	Paid Programming	Paid Programming Divided by JSC
2010	2.69%	3.89%	144.52%
2011	4.17%	3.72%	89.33%
2012	3.20%	2.76%	86.17%
2013	5.59%	2.43%	43.46%
Average	**3.91%**	**3.20%**	**90.87%**

	WGN Data		
	JSC Programming	Paid Programming	Paid Programming Divided by JSC
2010	32.17%	2.68%	8.34%
2011	36.40%	1.02%	2.81%
2012	22.56%	1.99%	8.82%
2013	19.64%	2.81%	14.31%
Average	**27.69%**	**2.13%**	**8.57%**

61. We compared Gray's predicted number of distantly viewing households to the number of distant viewing households reported in the Lindstrom dataset. If Gray's annual predicted distant viewing by station were reliable (which it is not), then the vast majority of the Gray distant viewing data (as reported in the Lindstrom NPM data) would fall within the confidence interval of Gray's predictions. We compared the viewing data as originally reported by Lindstrom for 2013 to the confidence interval surrounding Gray's predicted distant viewing households in his 2017 Testimony. The annual distant

[70] These shares use Gray Table 2 as-is without including the WGNA sports programs that Gray excluded.

viewing totals reported by Lindstrom for 144 of 146 stations were outside of the confidence interval of the distant viewing predicted by Gray. This is a failure rate of about 98 percent.

62. As discussed above, the Nielsen NPM sample is not appropriate for estimating Gray Table 2 shares because the data do not provide reliable estimates of distant viewing for Sample Stations. Given the limitations of the data disclosed by Gray in this case, it is not possible to correct the distant viewing data to produce reliable estimates. One aspect of the unreliability of the Gray data and his Table 2 estimates is that they overstate the distant viewing among households for the smaller stations (i.e., particularly Gray stratum 1 and 2 stations).

63. To evaluate if the overstated distant viewing among the smaller stations is material to the Table 2 shares estimates and to quantify the direction of the bias, we conducted a series of sensitivity analyses. **Table 21** shows the Gray Table 2 share estimates for 2013. We first corrected his share estimates by including the WGNA sports broadcasts omitted by Dr. Gray in his analysis. We then performed a series of sensitivity analyses where we made only one change to the Gray analysis. If the Gray share estimates were reasonable and properly apportioned distant viewing to the smaller stations, then these sensitivity analysis would show little or no change to the Gray Table 2 share estimates. These sensitivity analyses, however, show large changes to the Gray Table 2 share estimates and they demonstrate that the Gray estimates substantially understate the JSC share and overstate the Program Suppliers' share. For example:

- The column titled "Exclude KUNW" evaluates what would happen to Dr. Gray's Table 2 predictions if the data for KUNW were removed from the analysis. See ¶55 above. Given that this station has only 454 subscribers, it should have a de minimis impact on the outcome, even when it is representative of 40 other small

stations in Stratum 1. Yet, removing KUNW reduces the Program Suppliers' share by more than 6 percentage points and increases the JSC share by approximately 1.5 percentage points.

- The columns titled "Adjust stratum shares by Distant Subs" and "Adjust stratum shares by Fees Gen" evaluates the impact on the outcome if viewing shares are allocated proportionally to the level of distant subscribers (or fees generation) within each stratum. In that case, the Program Suppliers' share would decrease from 41.8 percent to 16.69 percent (weighted by distant subscribers) or to 14.27 percent (weighted by fees generated). The JSC share would increase from 10.74 percent to either 16.18 percent or 17.78 percent.
- Each of the remaining columns considers the outcome when the maximum level of distant viewership for each station is scaled down to at most 100% of distant subscribers, 50% of distant subscribers, down to 2% of distant subscribers. We know that no station can have more viewers than distant subscribers. Thus, 100% is the absolute ceiling. But even the most highly watched show — the Super Bowl — only attracts about 45% of potential viewers.[71] And the most highly watched situation comedies only attract about 8-9 percent of potential viewers.[72] As the sensitivity becomes more and more realistic, the Program Suppliers' share in Gray Table 2 drops even further and the JSC share increases even higher.

[71] Nathan Testimony, p. 11.
[72] Nathan Testimony, p. 12.

Table 21: Tests of Robustness and Bias of Gray's Share Estimates (2013)[73]

		New Share Estimates Use Exactly Gray's Analysis Except . . .									
		Include sports excluded by Gray									
	Gray Table 2	Include sports excluded by Gray	Exclude KUNW (454 Distant Subs)	Adjust stratum shares by Distant Subs	Adjust stratum shares by Fees Gen	Adjust "Actual" Nielsen Weighted Distant Viewing so the share compared to station's distant subscribers is less than . . .					
						100%	50%	20%	10%	5%	2%
can	3.80%	3.65%	4.45%	3.28%	1.83%	5.57%	6.32%	7.09%	6.80%	5.43%	3.21%
com	18.17%	17.47%	19.38%	52.95%	60.22%	19.51%	20.49%	22.99%	27.55%	34.14%	41.77%
dev	0.88%	0.84%	0.84%	0.22%	0.14%	0.69%	0.65%	0.58%	0.46%	0.32%	0.18%
ps	43.52%	41.84%	35.60%	16.69%	14.27%	33.78%	31.42%	27.13%	23.67%	18.60%	13.60%
public	26.48%	25.46%	27.54%	10.68%	5.77%	26.99%	26.43%	25.61%	20.71%	14.53%	7.54%
sports	7.15%	10.74%	12.19%	16.18%	17.78%	13.45%	14.69%	16.61%	20.82%	26.98%	33.71%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

64. We provide this sensitivity test simply as a gauge of the instability of Gray's predictions. We are not suggesting that any of the values in this sensitivity test is the "right answer". To the contrary, the unreliability of Gray's predictions render them unable to generate a reliable estimate of distant viewership with the possible exception of distant viewership on WGNA.

65. In sum, Gray Table 2 produces illogical results that are a reflection of Gray's attempt to use NPM data for a purpose it was not designed, an inadequate data set, and a regression analysis that exacerbates rather than solves the issues with the data set.

[73] Also see Appendix T.

Appendix A: Dr. Gray's Sampling Methodology

Table A-1: Number of Stations In Each Stratum (including sampled and non-sampled stations)

Stratum	2010	2011	2012	2013	Total
Stratum 1	632	706	759	792	2889
Stratum 2	310	325	317	315	1267
Stratum 3	158	162	156	149	625
Stratum 4	110	116	105	96	427
Stratum 5	29	29	45	46	149
Overall	**1239**	**1338**	**1382**	**1398**	**5357**

Table A-2: Average Distant Subscribers per Station by Stratum

Stratum	2010	2011	2012	2013	Total
Stratum 1	2,287	2,110	1,684	1,275	1,808
Stratum 2	13,000	12,307	10,020	8,842	11,043
Stratum 3	37,782	34,851	29,432	26,708	32,298
Stratum 4	98,277	99,891	83,692	71,774	89,171
Stratum 5	1,749,532	1,803,635	1,222,140	1,175,052	1,423,426

Table A-3: Percent of Total Distant Subscribers by Stratum

Stratum	2010	2011	2012	2013	Total
Stratum 1	2.0%	2.0%	1.8%	1.5%	1.8%
Stratum 2	5.5%	5.3%	4.4%	4.1%	4.8%
Stratum 3	8.2%	7.5%	6.3%	5.8%	7.0%
Stratum 4	14.8%	15.4%	12.1%	10.0%	13.1%
Stratum 5	69.5%	69.7%	75.5%	78.7%	73.2%

Table A-4: Probability of Sampling a Station (i.e., Percent of Stations Sampled)

Stratum	2010	2011	2012	2013	Average
Stratum 1	3.5%	2.8%	2.5%	2.4%	2.8%
Stratum 2	7.4%	6.5%	5.4%	6.3%	6.4%
Stratum 3	19.0%	14.2%	12.8%	14.8%	15.2%
Stratum 4	44.5%	51.7%	48.6%	45.8%	47.8%
Stratum 5	100%	100%	100%	100%	100%
Overall	12.3%	11.4%	11.0%	10.8%	11.4%

Table A-5: Total Sampled Stations

Stratum	2010	2011	2012	2013	Total
Stratum 1	22	20	19	19	80
Stratum 2	23	21	17	20	81
Stratum 3	30	23	20	22	95
Stratum 4	49	60	51	44	204
Stratum 5	29	29	45	46	149
Overall	**153**	**153**	**152**	**151**	**609**

Table A-6: 2013 Example of Gray Sampling

	Total Stations by Stratum	Total Sampled Stations	Probability of Sampling a Station	Gray Sampling Weight	Percent of Distant Subscribers by Stratum
Stratum 1	792	19	2.4%	41.7	1.5%
Stratum 2	315	20	6.3%	15.9	4.1%
Stratum 3	149	22	14.8%	6.8	5.8%
Stratum 4	96	44	45.8%	2.2	10.0%
Stratum 5	46	46	100%	1.0	78.7%
Overall	**1398**	**151**	10.8%		100%

Appendix B: Distant Viewing Household Counts for all 17.4 Million Compensable Non-WGNA Records in the Gray Data

act unwtd distant viewing	2010		2011		2012		2013		2010-2013	
	# records	%	# records	%	# records	%	# records	%	# records	%
No Data	3,923,450	93.139%	4,142,210	94.170%	3,997,983	93.718%	4,306,528	95.271%	16,370,171	94.095%
1	233,810	5.550%	215,148	4.891%	228,181	5.349%	183,433	4.058%	860,572	4.947%
2	41,953	0.996%	31,542	0.717%	31,565	0.740%	23,243	0.514%	128,303	0.737%
3	9,608	0.228%	6,760	0.154%	5,974	0.140%	4,930	0.109%	27,272	0.157%
4	2,514	0.060%	1,861	0.042%	1,446	0.034%	1,262	0.028%	7,083	0.041%
5	733	0.017%	692	0.016%	453	0.011%	464	0.010%	2,342	0.013%
6	278	0.007%	230	0.005%	200	0.005%	223	0.005%	931	0.005%
7	82	0.002%	98	0.002%	100	0.002%	114	0.003%	394	0.002%
8	37	0.001%	60	0.001%	33	0.001%	65	0.001%	195	0.001%
9	6	0.000%	31	0.001%	13	0.000%	21	0.000%	71	0.000%
10	2	0.000%	20	0.000%	6	0.000%	14	0.000%	42	0.000%
11	7	0.000%	8	0.000%			2	0.000%	17	0.000%
12	2	0.000%	5	0.000%			1	0.000%	8	0.000%
13			3	0.000%					3	0.000%
14			1	0.000%	2	0.000%			3	0.000%
36					1	0.000%			1	0.000%
39	1	0.000%							1	0.000%
43	1	0.000%							1	0.000%

Frequency of Actual Unweighted Distant Viewing: WGN

Gray Analysis Data 2010-2013 for WGN (Update of RGH Appendix B)

act unwtd distant viewing	2010		2011		2012		2013		2010-2013	
	# records	%	# records	%	# records	%	# records	%	# records	%
No Data	4	0.071%							4	0.023%
1	1	0.018%					2	0.055%	3	0.017%
2	3	0.053%	2	0.043%			2	0.055%	7	0.040%
3	8	0.142%	2	0.043%			9	0.247%	19	0.109%
4	15	0.267%	7	0.152%			11	0.302%	33	0.189%
5	42	0.747%	13	0.282%			30	0.823%	85	0.486%
6	52	0.925%	15	0.325%	9	0.248%	32	0.878%	108	0.617%
7	52	0.925%	21	0.455%	7	0.193%	33	0.905%	113	0.645%
8	71	1.263%	21	0.455%	19	0.524%	44	1.207%	155	0.885%
9	71	1.263%	27	0.585%	19	0.524%	33	0.905%	150	0.857%
10	93	1.654%	25	0.542%	33	0.911%	39	1.070%	190	1.085%
11	87	1.547%	43	0.932%	30	0.828%	48	1.317%	208	1.188%
12	71	1.263%	48	1.040%	31	0.856%	70	1.920%	220	1.257%
13	60	1.067%	42	0.910%	33	0.911%	44	1.207%	179	1.023%
14	51	0.907%	41	0.889%	22	0.607%	63	1.728%	177	1.011%
15	74	1.316%	30	0.650%	32	0.883%	75	2.057%	211	1.205%
16	57	1.014%	34	0.737%	40	1.104%	80	2.194%	211	1.205%
17	65	1.156%	32	0.694%	37	1.021%	87	2.386%	221	1.262%
18	48	0.854%	40	0.867%	40	1.104%	88	2.414%	216	1.234%
19	58	1.031%	40	0.867%	40	1.104%	95	2.606%	233	1.331%
20	69	1.227%	52	1.127%	59	1.628%	122	3.346%	302	1.725%
21	74	1.316%	42	0.910%	63	1.739%	119	3.264%	298	1.702%
22	67	1.192%	46	0.997%	77	2.125%	128	3.511%	318	1.817%
23	77	1.369%	60	1.300%	83	2.291%	106	2.907%	326	1.862%
24	69	1.227%	66	1.430%	111	3.064%	127	3.483%	373	2.131%
25	80	1.423%	83	1.799%	106	2.926%	121	3.319%	390	2.228%
26	103	1.832%	75	1.625%	112	3.091%	121	3.319%	411	2.348%
27	104	1.850%	86	1.864%	113	3.119%	120	3.291%	423	2.416%
28	108	1.921%	88	1.907%	121	3.340%	115	3.154%	432	2.468%
29	130	2.312%	87	1.886%	132	3.643%	103	2.825%	452	2.582%
30	136	2.419%	111	2.406%	142	3.919%	107	2.935%	496	2.833%
31	145	2.579%	113	2.449%	112	3.091%	112	3.072%	482	2.753%
32	151	2.685%	134	2.904%	119	3.285%	99	2.715%	503	2.873%
33	135	2.401%	124	2.687%	101	2.788%	111	3.044%	471	2.691%
34	139	2.472%	142	3.078%	114	3.147%	77	2.112%	472	2.696%
35	137	2.436%	136	2.948%	139	3.837%	89	2.441%	501	2.862%
36	128	2.276%	137	2.969%	83	2.291%	81	2.222%	429	2.451%
37	131	2.330%	142	3.078%	107	2.953%	54	1.481%	434	2.479%
38	123	2.187%	134	2.904%	89	2.457%	60	1.646%	406	2.319%
39	113	2.010%	125	2.709%	67	1.849%	68	1.865%	373	2.131%
40	114	2.027%	115	2.492%	65	1.794%	52	1.426%	346	1.976%
41	103	1.832%	121	2.622%	63	1.739%	46	1.262%	333	1.902%
42	87	1.547%	119	2.579%	57	1.573%	51	1.399%	314	1.794%
43	103	1.832%	93	2.016%	69	1.905%	56	1.536%	321	1.834%

Frequency of Actual Unweighted Distant Viewing: WGN

44	95	1.689%	99	2.146%	70	1.932%	42	1.152%	306	1.748%
45	116	2.063%	84	1.821%	55	1.518%	45	1.234%	300	1.714%
46	89	1.583%	84	1.821%	55	1.518%	41	1.125%	269	1.537%
47	80	1.423%	76	1.647%	45	1.242%	27	0.741%	228	1.302%
48	99	1.761%	61	1.322%	55	1.518%	41	1.125%	256	1.462%
49	75	1.334%	74	1.604%	41	1.132%	32	0.878%	222	1.268%
50	72	1.280%	64	1.387%	43	1.187%	37	1.015%	216	1.234%
51	82	1.458%	69	1.495%	53	1.463%	30	0.823%	234	1.337%
52	75	1.334%	74	1.604%	36	0.994%	33	0.905%	218	1.245%
53	70	1.245%	70	1.517%	33	0.911%	18	0.494%	191	1.091%
54	68	1.209%	57	1.235%	40	1.104%	22	0.603%	187	1.068%
55	61	1.085%	63	1.365%	33	0.911%	17	0.466%	174	0.994%
56	66	1.174%	60	1.300%	33	0.911%	15	0.411%	174	0.994%
57	62	1.103%	51	1.105%	28	0.773%	13	0.357%	154	0.880%
58	63	1.120%	47	1.019%	26	0.718%	10	0.274%	146	0.834%
59	72	1.280%	48	1.040%	26	0.718%	15	0.411%	161	0.920%
60	67	1.192%	53	1.149%	17	0.469%	12	0.329%	149	0.851%
61	45	0.800%	53	1.149%	22	0.607%	5	0.137%	125	0.714%
62	52	0.925%	44	0.954%	23	0.635%	10	0.274%	129	0.737%
63	53	0.943%	43	0.932%	12	0.331%	6	0.165%	114	0.651%
64	38	0.676%	37	0.802%	15	0.414%	3	0.082%	93	0.531%
65	43	0.765%	31	0.672%	22	0.607%	3	0.082%	99	0.566%
66	38	0.676%	27	0.585%	13	0.359%	5	0.137%	83	0.474%
67	36	0.640%	23	0.498%	10	0.276%	2	0.055%	71	0.406%
68	42	0.747%	25	0.542%	5	0.138%	3	0.082%	75	0.428%
69	24	0.427%	20	0.433%	11	0.304%	2	0.055%	57	0.326%
70	20	0.356%	27	0.585%	6	0.166%	5	0.137%	58	0.331%
71	21	0.373%	28	0.607%	8	0.221%	4	0.110%	61	0.348%
72	23	0.409%	26	0.564%	13	0.359%	1	0.027%	63	0.360%
73	24	0.427%	17	0.368%	6	0.166%	1	0.027%	48	0.274%
74	20	0.356%	14	0.303%	7	0.193%	2	0.055%	43	0.246%
75	14	0.249%	18	0.390%	8	0.221%	1	0.027%	41	0.234%
76	20	0.356%	15	0.325%	4	0.110%	1	0.027%	40	0.228%
77	12	0.213%	14	0.303%	4	0.110%	1	0.027%	31	0.177%
78	16	0.285%	10	0.217%	5	0.138%			31	0.177%
79	4	0.071%	10	0.217%	6	0.166%			20	0.114%
80	15	0.267%	8	0.173%	7	0.193%	4	0.110%	34	0.194%
81	10	0.178%	10	0.217%	4	0.110%	1	0.027%	25	0.143%
82	14	0.249%	10	0.217%	3	0.083%	1	0.027%	28	0.160%
83	11	0.196%	4	0.087%	5	0.138%	1	0.027%	21	0.120%
84	5	0.089%	7	0.152%					12	0.069%
85	8	0.142%	3	0.065%	2	0.055%			13	0.074%
86	9	0.160%	6	0.130%	1	0.028%	1	0.027%	17	0.097%
87	8	0.142%	1	0.022%	4	0.110%			13	0.074%
88	6	0.107%	4	0.087%	5	0.138%			15	0.086%
89	8	0.142%	1	0.022%	3	0.083%			12	0.069%
90	3	0.053%	5	0.108%			1	0.027%	9	0.051%
91	4	0.071%	3	0.065%	1	0.028%			8	0.046%
92	3	0.053%	1	0.022%	1	0.028%			5	0.029%
93			1	0.000217					1	0.006%

Frequency of Actual Unweighted Distant Viewing: WGN

94	5	0.00089	5	0.001084			1	0.00027	11	0.063%
95			1	0.000217	2	0.000552			3	0.017%
96	2	0.00036	5	0.001084					7	0.040%
97	7	0.00124	3	0.00065					10	0.057%
98	6	0.00107	1	0.000217					7	0.040%
99	1	0.00018							1	0.006%
100			1	0.000217			1	0.00027	2	0.011%
101	2	0.00036							2	0.011%
102	2	0.00036							2	0.011%
103			1	0.000217					1	0.006%
104	2	0.00036							2	0.011%
105	2	0.00036							2	0.011%
106	3	0.00053	1	0.000217					4	0.023%
107	1	0.00018							1	0.006%
108			1	0.000217					1	0.006%
109	1	0.00018							1	0.006%
111	2	0.00036	1	0.000217					3	0.017%
112	1	0.00018							1	0.006%
113	1	0.00018							1	0.006%
115	1	0.00018							1	0.006%
117	2	0.00036							2	0.011%
118	1	0.00018							1	0.006%
122	1	0.00018							1	0.006%
123	1	0.00018							1	0.006%
125	2	0.00036							2	0.011%
127	3	0.00053							3	0.017%
128	2	0.00036							2	0.011%
131	1	0.00018							1	0.006%
144	1	0.00018							1	0.006%

Appendix C: Lindstrom NPM Data For WGN Records Used By Gray Data

[redacted]

Appendix D: All Gray WGN Records With Any Distant Viewing (Based On Lindstrom Data)

[redacted]

Appendix E: Gray Data by Year, Stratum, and Call Sign

[redacted]

Appendix E: Gray Data by Year, Stratum, and Call Sign

[redacted]

Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

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Appendix E: Gray Data by Year, Stratum, and Call Sign

[redacted]

Appendix F: Average Distant Metrics for Sample Stations 2010-13

[redacted]

Appendix F: Average Distant Metrics for Sample Stations 2010-13

[redacted]

Appendix F: Average Distant Metrics for Sample Stations 2010-13

[redacted]

Appendix F: Average Distant Metrics for Sample Stations 2010-13

[redacted]

Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix F: Average Distant Metrics for Sample Stations 2010-13

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Appendix G: Select WGN Data For Distant Viewing Households Provided By Nielsen To MLB

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Appendix H: Gray Table 2
Gray Predictions vs Gray Data (2018 Analysis with New WGNA data)

		Total Viewing			Percent of Viewing		
		Gray Table 2 Totals of Distant Viewing from Gray Regression Predictions		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)	Gray Table 2 Shares of Distant Viewing from Gray Regression Predictions		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)
Category	year	All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data		All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data	
can	2010	150,412,151	63,294,858	39,029,666	1.66%	0.80%	0.53%
com	2010	1,926,448,507	1,749,010,340	2,404,776,285	21.27%	22.15%	32.69%
dev	2010	127,734,088	102,877,241	42,330,050	1.41%	1.30%	0.58%
ps	2010	4,044,541,411	3,302,624,871	2,661,578,081	44.66%	41.82%	36.18%
public	2010	2,183,929,113	2,098,808,032	1,688,628,698	24.12%	26.58%	22.95%
sports	2010	622,863,267	580,051,191	520,157,521	6.88%	7.35%	7.07%
		9,055,928,537	**7,896,666,533**	**7,356,500,301**	**100%**	**100%**	**100%**
can	2011	257,620,791	71,011,474	30,485,140	3.38%	1.07%	0.52%
com	2011	1,501,042,617	1,371,622,843	1,356,148,817	19.68%	20.57%	23.16%
dev	2011	131,269,192	107,946,238	35,998,672	1.72%	1.62%	0.61%
ps	2011	3,187,300,264	2,723,657,109	2,262,069,675	41.80%	40.85%	38.64%
public	2011	1,849,697,251	1,767,322,262	1,581,109,567	24.26%	26.51%	27.01%
sports	2011	698,443,656	625,658,054	588,770,202	9.16%	9.38%	10.06%
		7,625,373,771	**6,667,217,980**	**5,854,582,073**	**100%**	**100%**	**100%**
can	2012	250,425,806	86,030,791	31,578,775	3.21%	1.28%	0.52%
com	2012	1,833,992,106	1,468,004,791	1,842,517,668	23.50%	21.78%	30.09%
dev	2012	70,897,418	70,238,723	13,033,437	0.91%	1.04%	0.21%
ps	2012	2,614,022,438	2,333,129,191	1,681,050,985	33.49%	34.62%	27.45%
public	2012	2,618,043,885	2,385,856,302	2,218,368,426	33.54%	35.40%	36.23%
sports	2012	417,592,175	395,718,616	337,204,497	5.35%	5.87%	5.51%
		7,804,973,828	**6,738,978,414**	**6,123,753,788**	**100%**	**100%**	**100%**
can	2013	236,713,153	63,383,934	28,736,927	3.80%	1.22%	0.45%
com	2013	1,132,947,152	996,427,790	1,236,818,237	18.17%	19.14%	19.39%
dev	2013	54,763,752	44,219,075	54,464,471	0.88%	0.85%	0.85%
ps	2013	2,713,378,344	2,223,789,907	3,330,799,644	43.52%	42.71%	52.22%
public	2013	1,651,304,941	1,485,200,808	1,347,091,558	26.48%	28.52%	21.12%
sports	2013	446,131,307	394,129,799	380,314,382	7.15%	7.57%	5.96%
		6,235,238,649	**5,207,151,313**	**6,378,225,219**	**100%**	**100%**	**100%**
can	all	895,171,901	283,721,057	129,830,508	2.9%	**1.1%**	**0.5%**
com	all	6,394,430,382	5,585,065,764	6,840,261,007	20.8%	**21.1%**	**26.6%**
dev	all	384,664,450	325,281,277	145,826,630	1.3%	**1.2%**	**0.6%**
ps	all	12,559,242,457	10,583,201,078	9,935,498,385	40.9%	**39.9%**	**38.6%**
public	all	8,302,975,190	7,737,187,404	6,835,198,249	27.0%	**29.2%**	**26.6%**
sports	all	2,185,030,405	1,995,557,660	1,826,446,602	7.1%	**7.5%**	**7.1%**
		30,721,514,785	**26,510,014,240**	**25,713,061,381**	**100%**	**100%**	**100%**

Appendix H: Gray Table 2
Gray Predictions vs Gray Data (2017 Analysis with Original WGNA Data)

		Total Viewing			Percent of Viewing		
		Gray Table 2 Totals of Distant Viewing from Gray Regression Predictions		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)	Gray Table 2 Shares of Distant Viewing from Gray Regression Predictions		Distant Viewing According to Lindstrom Data (Only Sample Stations with Lindstrom data)
Category	year	All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data		All Sample Stations (Same as Table 2)	Only Sample Stations with Lindstrom data	
can	2010	22,577	9,162	13,610	1.96%	0.94%	1.85%
com	2010	181,958	154,681	200,288	15.83%	15.92%	27.16%
dev	2010	13,598	10,381	1,806	1.18%	1.07%	0.25%
ps	2010	585,521	467,672	288,844	50.94%	48.14%	39.18%
public	2010	321,335	308,085	222,151	27.96%	31.71%	30.13%
sports	2010	24,466	21,441	10,607	2.13%	2.21%	1.44%
		1,149,455	**971,422**	**737,307**	**100%**	**100%**	**100%**
can	2011	39,472	9,637	11,560	3.93%	1.14%	2.01%
com	2011	121,186	98,428	79,286	12.06%	11.68%	13.81%
dev	2011	24,497	19,214	2,542	2.44%	2.28%	0.44%
ps	2011	501,580	417,924	242,735	49.92%	49.60%	42.28%
public	2011	292,267	276,981	220,239	29.09%	32.87%	38.37%
sports	2011	25,803	20,411	17,697	2.57%	2.42%	3.08%
		1,004,804	**842,594**	**574,059**	**100%**	**100%**	**100%**
can	2012	37,007	13,289	10,634	3.58%	1.52%	1.66%
com	2012	159,938	107,645	127,226	15.48%	12.33%	19.87%
dev	2012	11,032	10,940	1,088	1.07%	1.25%	0.17%
ps	2012	373,313	329,210	176,854	36.14%	37.71%	27.62%
public	2012	430,093	391,148	309,541	41.64%	44.80%	48.33%
sports	2012	21,596	20,856	15,077	2.09%	2.39%	2.35%
		1,032,980	**873,088**	**640,419**	**100%**	**100%**	**100%**
can	2013	38,340	11,014	10,611	5.16%	1.83%	1.88%
com	2013	78,754	63,413	82,545	10.61%	10.54%	14.59%
dev	2013	8,160	6,595	4,565	1.10%	1.10%	0.81%
ps	2013	334,733	263,661	266,799	45.09%	43.81%	47.15%
public	2013	247,143	223,391	181,818	33.29%	37.12%	32.13%
sports	2013	35,303	33,718	19,528	4.76%	5.60%	3.45%
		742,435	**601,792**	**565,866**	**100%**	**100%**	**100%**
can	all	137,396	43,101	46,416	3.5%	**1.3%**	**1.8%**
com	all	541,836	424,168	489,345	13.8%	**12.9%**	**19.4%**
dev	all	57,286	47,130	10,002	1.5%	**1.4%**	**0.4%**
ps	all	1,795,148	1,478,467	975,231	45.7%	**45.0%**	**38.7%**
public	all	1,290,838	1,199,604	933,749	32.8%	**36.5%**	**37.1%**
sports	all	107,169	96,425	62,909	2.7%	**2.9%**	**2.5%**
		3,929,673	**3,288,895**	**2,517,651**	**100%**	**100%**	**100%**

Appendix I

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Appendix J: KRBC 2012 Top 100 records based on Gray's Predicted Distant Viewing (and overall totals and averages)

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Appendix K: Nielsen Weighted Distant Viewing for Single NPM (only 1 household)

[redacted]

Appendix K: Nielsen Weighted Distant Viewing for Single NPM (only 1 household)

[redacted]

Appendix K: Nielsen Weighted Distant Viewing for Single NPM (only 1 household)

[redacted]

Appendix K: Nielsen Weighted Distant Viewing for Single NPM (only 1 household)

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Appendix L: Adjust Gray Shares within Stratum by Fees Gen

Adjust Gray Shares within Stratum by Fees Gen

Agreed Category	2010	2011	2012	2013	Average
can	0.98%	1.49%	1.80%	1.83%	1.52%
com	40.74%	48.57%	58.77%	60.22%	52.08%
dev	2.04%	1.39%	0.43%	0.14%	1.00%
ps	23.04%	11.15%	13.71%	14.27%	15.54%
public	5.19%	5.75%	5.46%	5.77%	5.54%
sports	28.00%	31.65%	19.83%	17.78%	24.32%

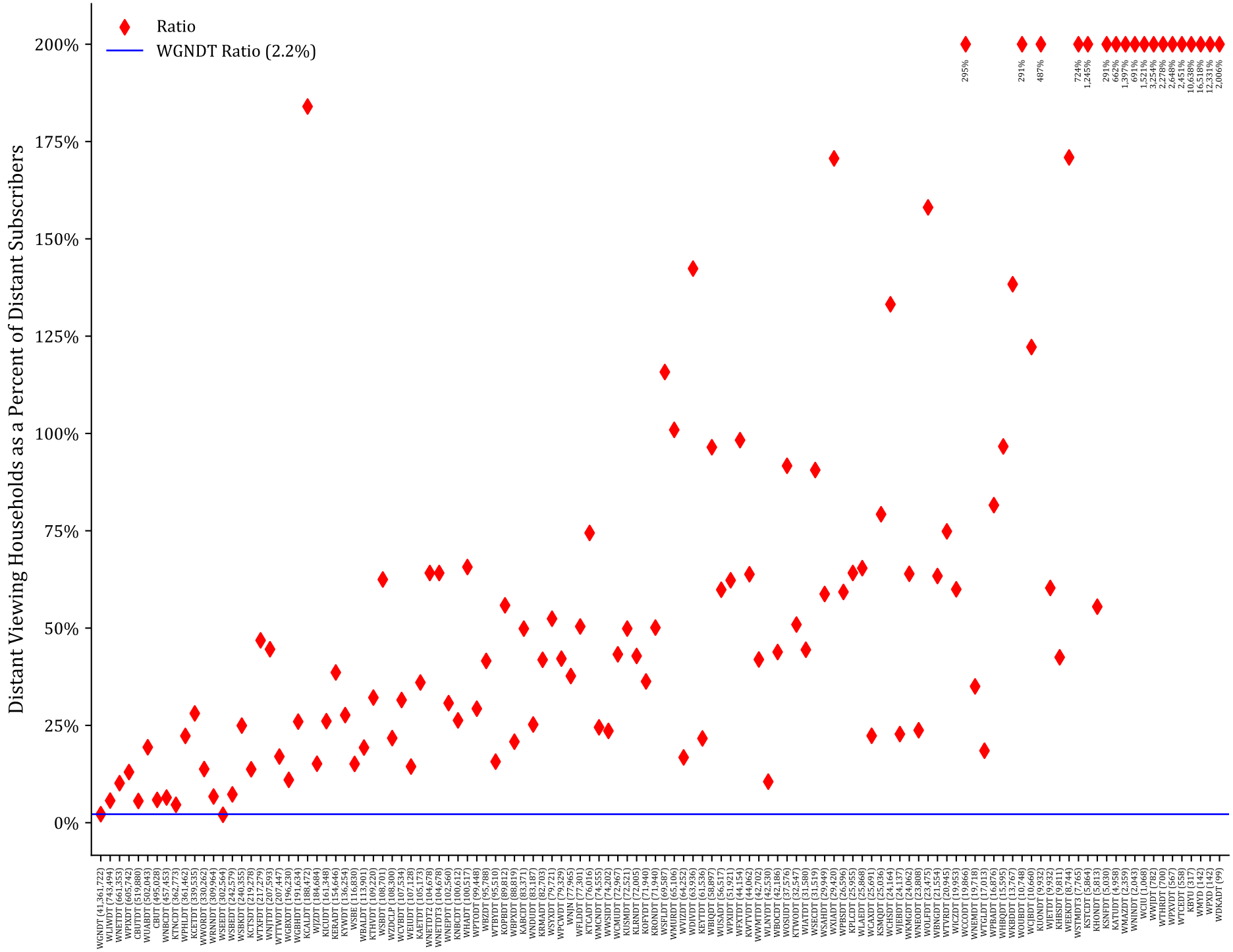
Adjust Gray Shares within Stratum by Distant Subscribers

Agreed Category	2010	2011	2012	2013	Average
can	1.70%	2.53%	3.23%	3.28%	2.68%
com	36.75%	43.03%	51.24%	52.95%	45.99%
dev	1.84%	1.28%	0.43%	0.22%	0.94%
ps	25.65%	14.88%	17.27%	16.69%	18.62%
public	9.60%	10.59%	10.47%	10.68%	10.34%
sports	24.46%	27.68%	17.36%	16.18%	21.42%

Appendix M: Distant Viewing Households as a Percent of Distant Subscribers According to Gray Data

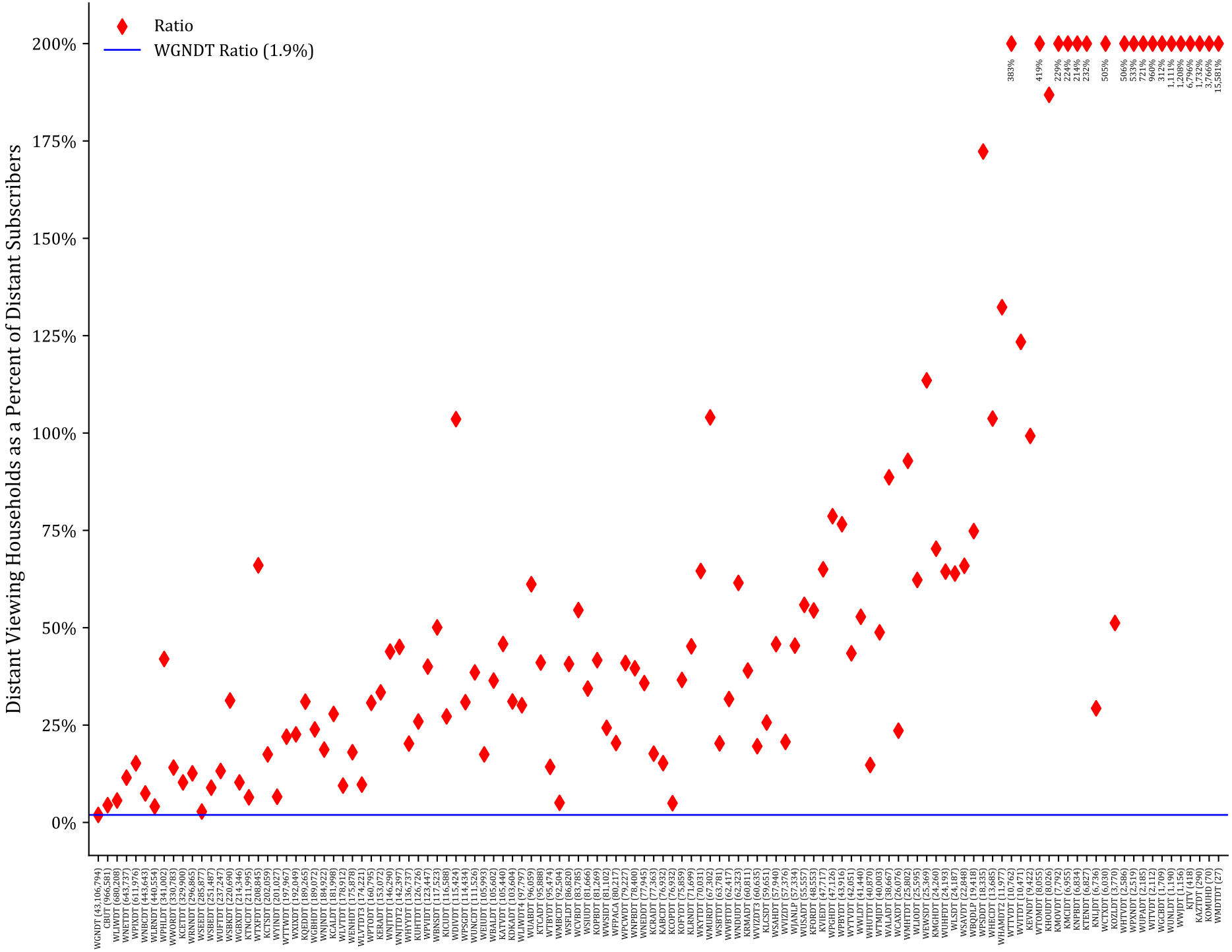
PUBLIC VERSION

Distant Viewing Households as a Percent of Distant Subscribers According to Gray Data (2010)



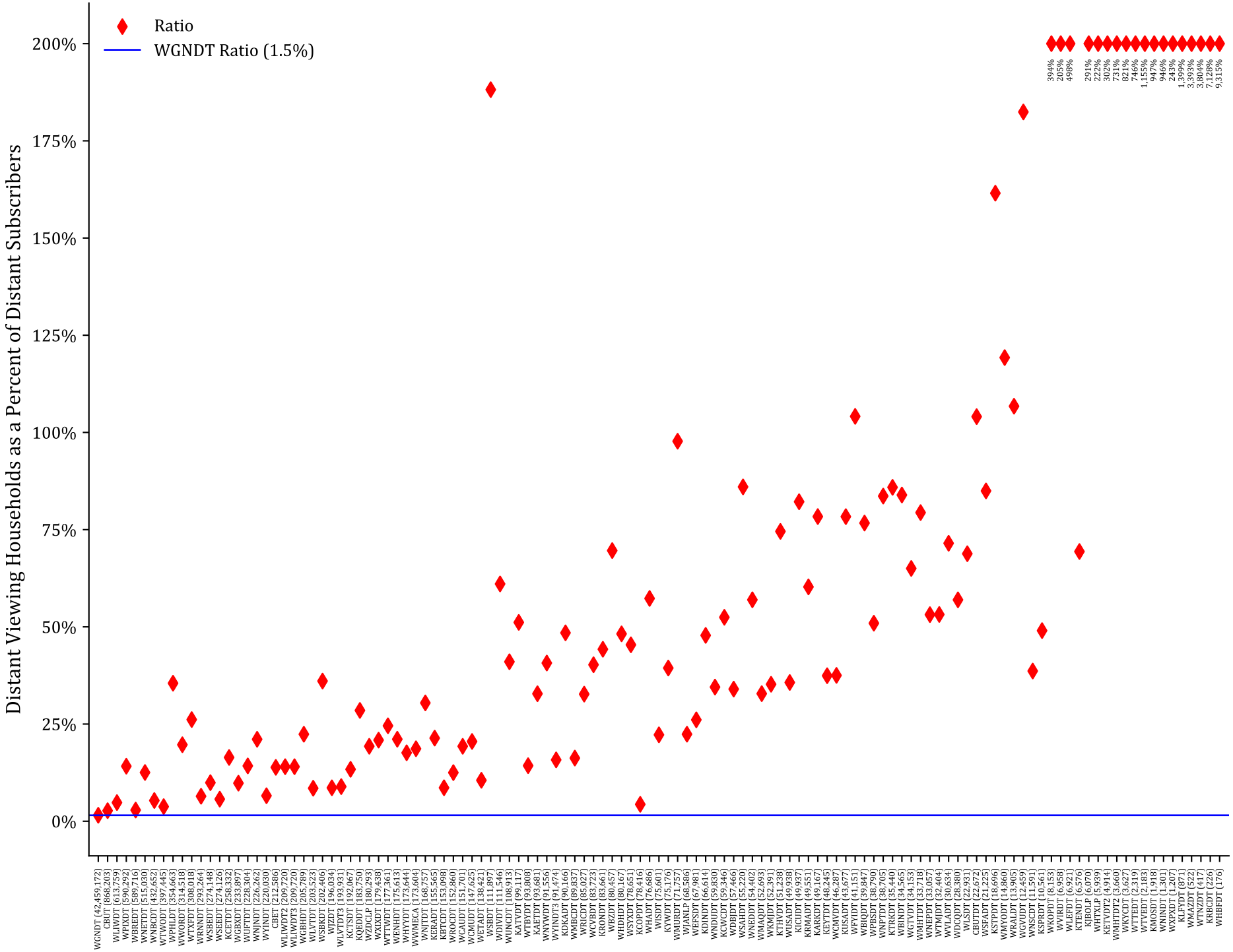
PUBLIC VERSION

Distant Viewing Households as a Percent of Distant Subscribers According to Gray Data (2011)



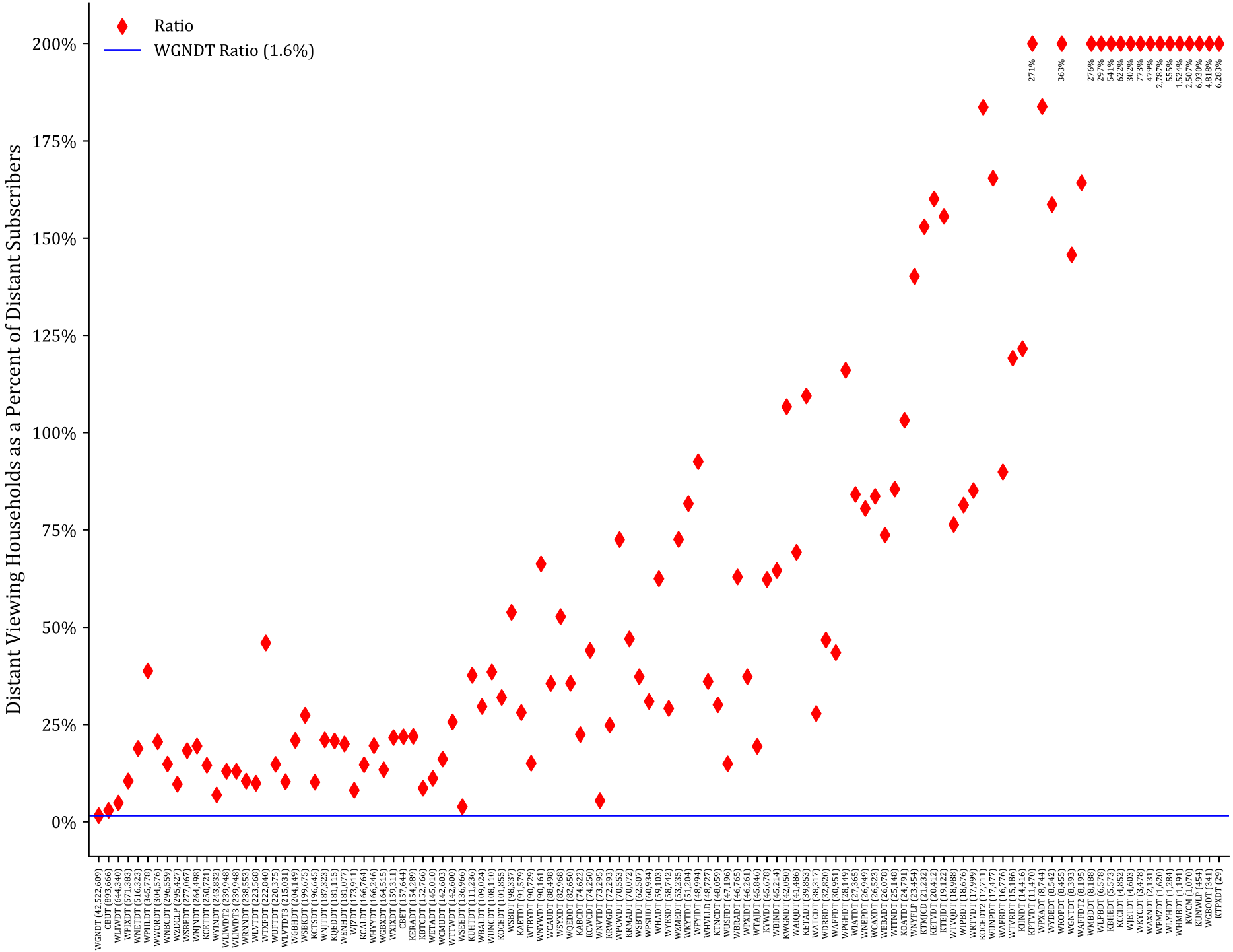
PUBLIC VERSION

Distant Viewing Households as a Percent of Distant Subscribers According to Gray Data (2012)



PUBLIC VERSION

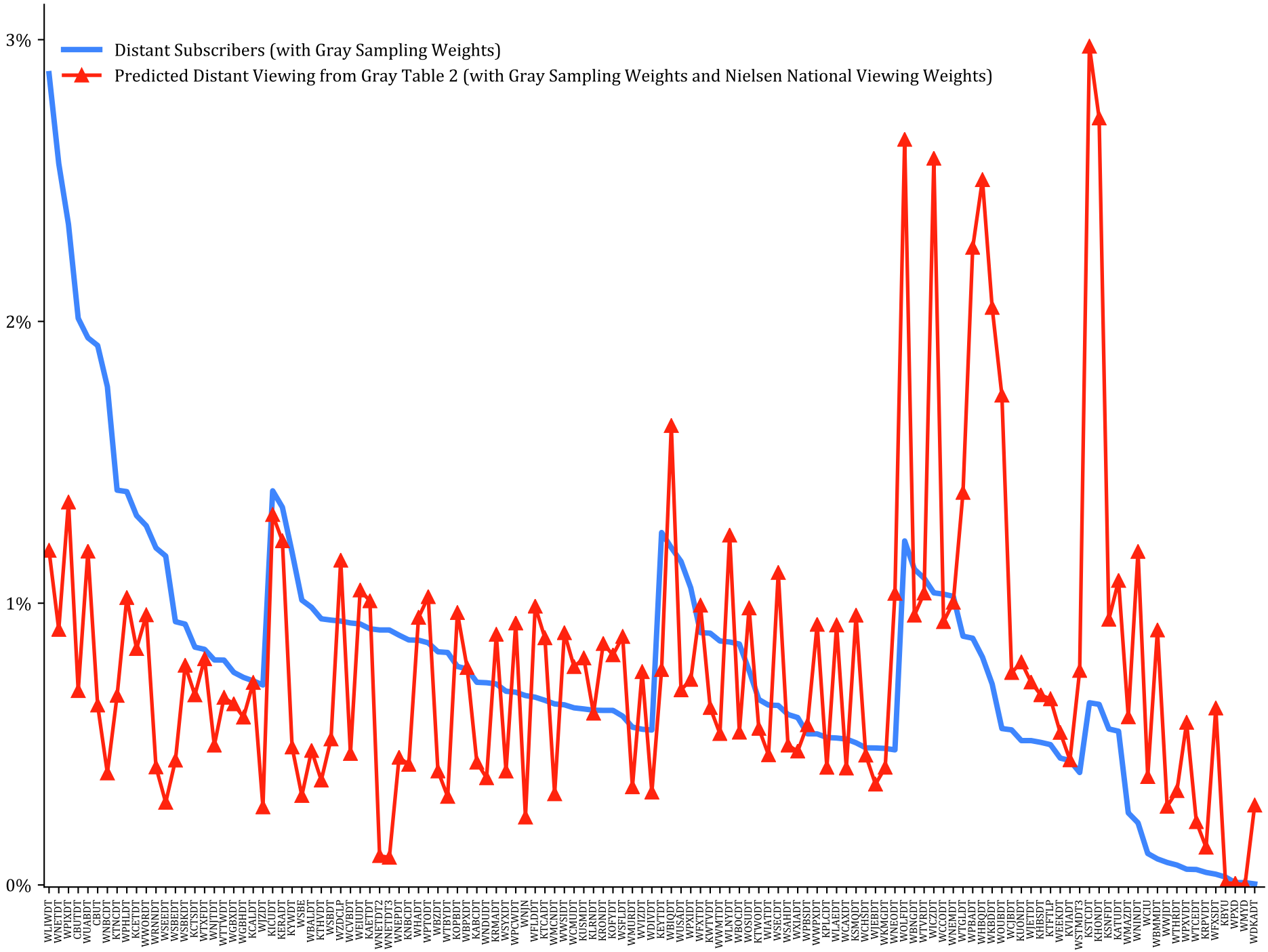
Distant Viewing Households as a Percent of Distant Subscribers According to Gray Data (2013)



Appendix N: Share of Gray Predicted Distant Viewing Compared to Share of Distant Subscribers

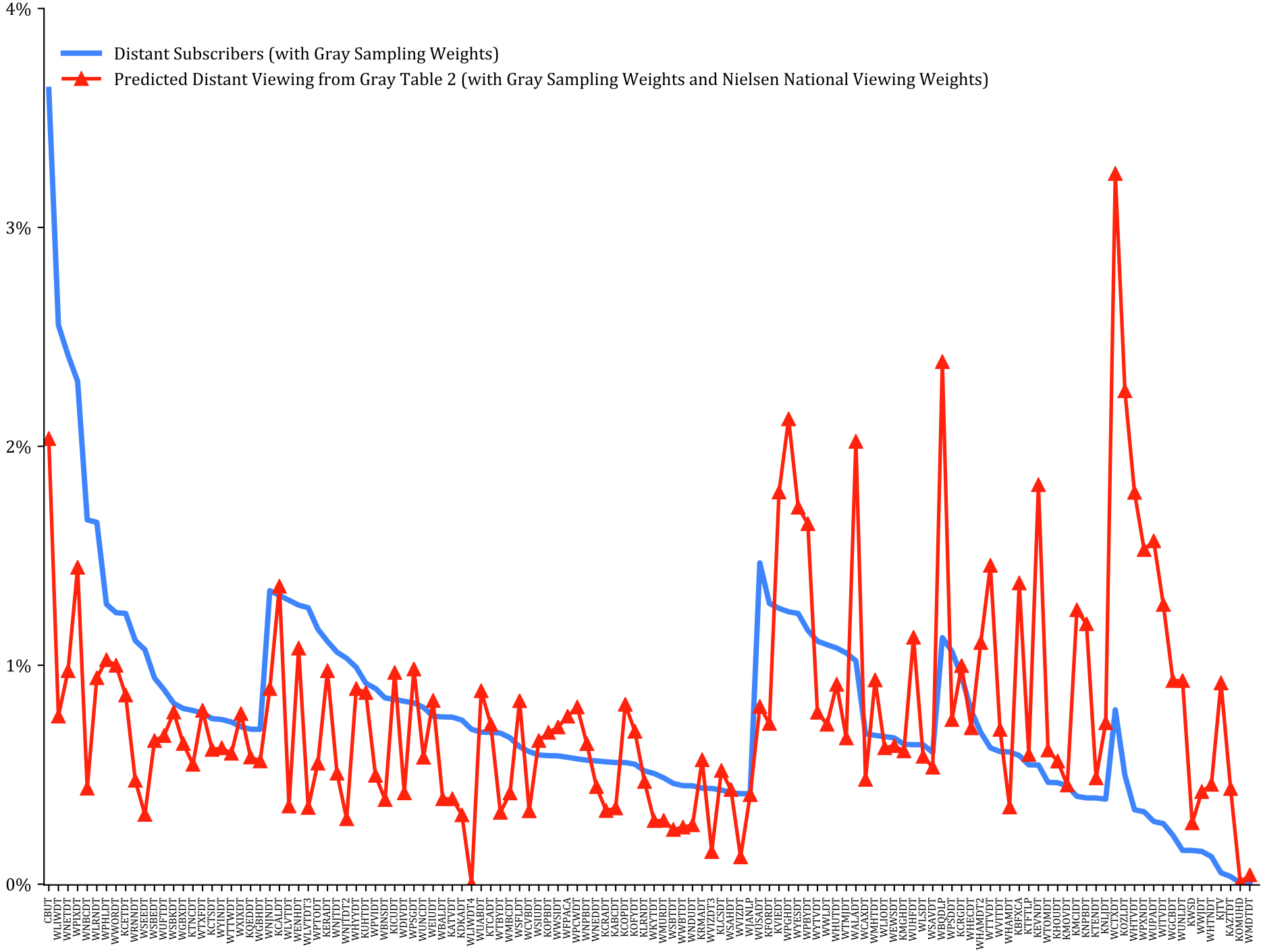
PUBLIC VERSION

Share of Gray Predicted Distant Viewing Compared to Share of Distant Subscribers 2010



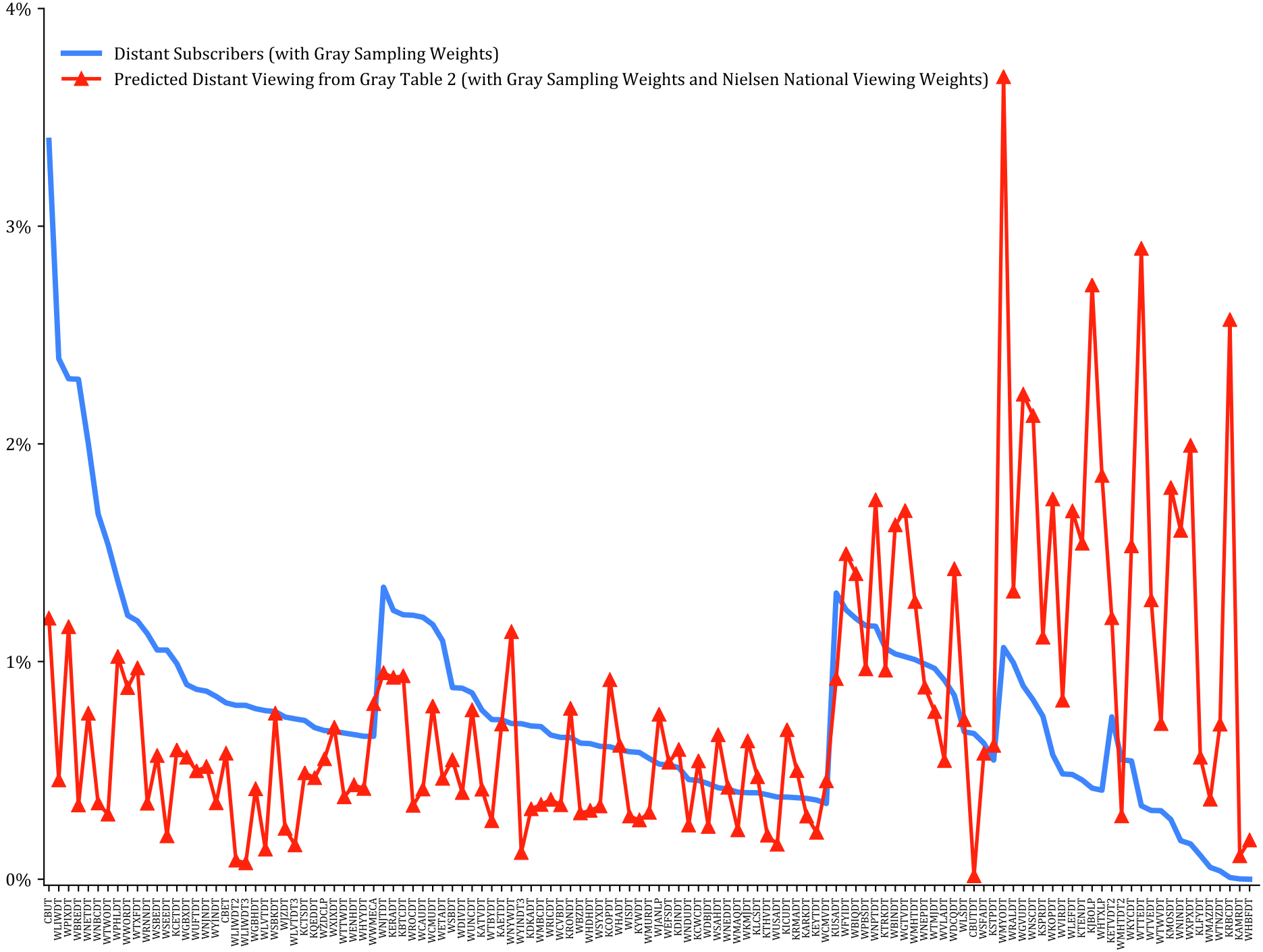
PUBLIC VERSION

Share of Gray Predicted Distant Viewing Compared to Share of Distant Subscribers 2011



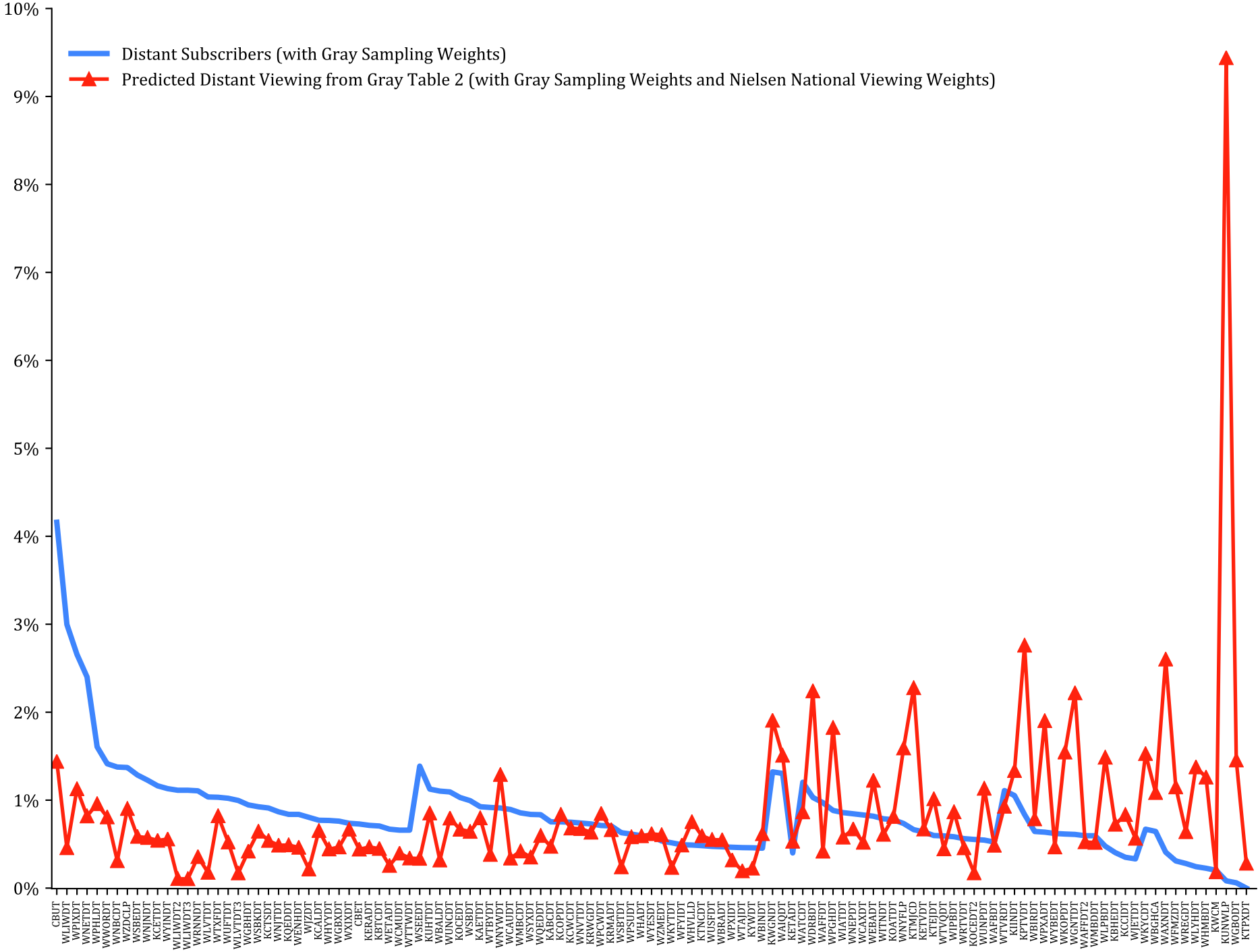
PUBLIC VERSION

Share of Gray Predicted Distant Viewing Compared to Share of Distant Subscribers 2012



PUBLIC VERSION

Share of Gray Predicted Distant Viewing Compared to Share of Distant Subscribers 2013



Appendix O: 154 Sports Broadcasts Missing from the Gray WGNA data 2010-2013

row	Date	Program Name	Start Time	Episode Name	Duration
1	07/21/10	CUBS BASEBALL	2:10 PM	ASTROS/CUBS	251
2	08/30/10	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/INDIANS	262
3	04/09/11	WHITE SOX BASEBALL	4:00 PM	DEVIL RAYS/WHITE SOX	184
4	04/10/11	CUBS BASEBALL	1:57 PM	CUBS/BREWERS	201
5	05/10/11	CUBS BASEBALL	8:00 PM	CARDINALS/CUBS	187
6	05/11/11	WHITE SOX BASEBALL	10:00 PM	WHITE SOX/ANGELS	209
7	05/29/11	CUBS BASEBALL	2:15 PM	PIRATES/CUBS	8
8	05/29/11	CUBS BASEBALL	4:46 PM	PIRATES/CUBS	174
9	03/17/12	BULLS BASKETBALL	8:00 PM	76ERS/BULLS	154
10	04/05/12	CUBS BASEBALL	1:58 PM	NATIONALS/CUBS	189
11	04/08/12	CUBS BASEBALL	2:09 PM	NATIONALS/CUBS	164
12	04/11/12	CUBS BASEBALL	2:11 PM	BREWERS/CUBS	196
13	04/15/12	WHITE SOX BASEBALL	1:58 PM	TIGERS/WHITE SOX	204
14	04/22/12	CUBS BASEBALL	2:09 PM	REDS/CUBS	210
15	04/25/12	CUBS BASEBALL	2:11 PM	CARDINALS/CUBS	190
16	05/07/12	WHITE SOX BASEBALL	1:28 PM	WHITE SOX/INDIANS	182
17	05/08/12	CUBS BASEBALL	8:00 PM	BRAVES/CUBS	179
18	05/11/12	CUBS BASEBALL	8:00 PM	CUBS/BREWERS	318
19	05/12/12	WHITE SOX BASEBALL	6:58 PM	ROYALS/WHITE SOX	8
20	05/12/12	WHITE SOX BASEBALL	8:01 PM	ROYALS/WHITE SOX	177
21	05/13/12	CUBS BASEBALL	1:57 PM	CUBS/BREWERS	218
22	05/18/12	CUBS BASEBALL	2:08 PM	WHITE SOX/CUBS	177
23	05/20/12	WHITE SOX BASEBALL	2:12 PM	WHITE SOX/CUBS	196
24	05/28/12	CUBS BASEBALL	2:10 PM	PADRES/CUBS	209
25	05/30/12	WHITE SOX BASEBALL	1:00 PM	DEVIL RAYS/WHITE SOX	195
26	06/01/12	CUBS BASEBALL	10:09 PM	CUBS/GIANTS	172
27	06/02/12	WHITE SOX BASEBALL	4:00 PM	MARINERS/WHITE/SOX	272
28	06/03/12	CUBS BASEBALL	4:00 PM	CUBS/GIANTS	155
29	06/05/12	CUBS BASEBALL	8:00 PM	CUBS/BREWERS	184
30	06/08/12	CUBS BASEBALL	8:00 PM	CUBS/TWINS	232
31	06/09/12	WHITE SOX BASEBALL	4:00 PM	ASTROS/WHITE SOX	183
32	06/10/12	CUBS BASEBALL	1:56 PM	CUBS/TWINS	195
33	06/29/12	CUBS BASEBALL	2:09 PM	ASTROS/CUBS	215
34	07/05/12	WHITE SOX BASEBALL	2:00 PM	RANGERS/WHITE SOX	151
35	07/15/12	CUBS BASEBALL	2:10 PM	DIAMONDBACKS/CUBS	187
36	07/20/12	CUBS BASEBALL	8:08 PM	CUBS/CARDINALS	173
37	07/22/12	CUBS BASEBALL	2:07 PM	CUBS/CARDINALS	181
38	07/29/12	CUBS BASEBALL	2:09 PM	CARDINALS/CUBS	226
39	07/31/12	CUBS BASEBALL	8:00 PM	PIRATES/CUBS	184
40	08/01/12	CUBS BASEBALL	2:11 PM	PIRATES/CUBS	220
41	08/03/12	CUBS BASEBALL	10:00 PM	CUBS/DODGERS	177
42	08/04/12	WHITE SOX BASEBALL	6:58 PM	ANGELS/WHITE SOX	7
43	08/04/12	WHITE SOX BASEBALL	7:27 PM	ANGELS/WHITE SOX	216
44	08/05/12	CUBS BASEBALL	4:00 PM	CUBS/DODGERS	223
45	08/10/12	CUBS BASEBALL	2:09 PM	REDS/CUBS	252
46	08/12/12	CUBS BASEBALL	2:09 PM	REDS/CUBS	177
47	08/15/12	CUBS BASEBALL	2:11 PM	ASTROS/CUBS	199

Appendix O: 154 Sports Broadcasts Missing from the Gray WGNA data 2010-2013

48	08/17/12	CUBS BASEBALL	7:00 PM	CUBS/REDS	187
49	08/18/12	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/ROYALS	198
50	08/19/12	CUBS BASEBALL	1:00 PM	CUBS/REDS	190
51	08/22/12	CUBS BASEBALL	2:00 PM	CUBS/BREWERS	180
52	08/24/12	CUBS BASEBALL	2:09 PM	ROCKIES/CUBS	173
53	08/25/12	WHITE SOX BASEBALL	7:00 PM	MARINERS/WHITE/SOX	214
54	08/26/12	CUBS BASEBALL	2:10 PM	ROCKIES/CUBS	7
55	08/26/12	CUBS BASEBALL	4:30 PM	ROCKIES/CUBS	168
56	08/28/12	CUBS BASEBALL	8:00 PM	BREWERS/CUBS	168
57	08/29/12	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/ORIOLES	185
58	08/30/12	WHITE SOX BASEBALL	12:30 PM	WHITE SOX/ORIOLES	165
59	09/01/12	CUBS BASEBALL	1:00 PM	GIANTS/CUBS	201
60	09/01/12	WHITE SOX BASEBALL	6:58 PM	WHITE SOX/TIGERS	214
61	09/02/12	CUBS BASEBALL	2:09 PM	GIANTS/CUBS	204
62	09/03/12	CUBS BASEBALL	1:00 PM	CUBS/NATIONALS	180
63	09/09/12	CUBS BASEBALL	1:30 PM	CUBS/PIRATES	216
64	09/14/12	CUBS BASEBALL	2:09 PM	PIRATES/CUBS	218
65	09/16/12	CUBS BASEBALL	2:09 PM	PIRATES/CUBS	268
66	09/21/12	WHITE SOX BASEBALL	10:00 PM	WHITE SOX/ANGELS	169
67	09/22/12	CUBS BASEBALL	1:00 PM	CARDINALS/CUBS	231
68	09/23/12	CUBS BASEBALL	2:11 PM	CARDINALS/CUBS	209
69	10/03/12	CUBS BASEBALL	2:13 PM	ASTROS/CUBS	199
70	10/13/12	BULLS BASKETBALL	7:59 PM	BULLS/TIMBERWOLVES	163
71	11/10/12	BULLS BASKETBALL	7:56 PM	TIMBERWOLVES/BULLS	150
72	11/18/12	BULLS BASKETBALL	9:00 PM	BULLS/TRAILBLAZERS	151
73	11/24/12	BULLS BASKETBALL	9:00 PM	BULLS/BUCKS	139
74	12/01/12	BULLS BASKETBALL	7:57 PM	76ERS/BULLS	154
75	12/22/12	BULLS BASKETBALL	7:00 PM	BULLS/HAWKS	130
76	12/29/12	BULLS BASKETBALL	7:59 PM	WIZARDS/BULLS	144
77	12/31/12	BULLS BASKETBALL	3:00 PM	BOBCATS/BULLS	153
78	01/07/13	BULLS BASKETBALL	8:00 PM	CAVALIERS/BULLS	146
79	01/12/13	BULLS BASKETBALL	7:58 PM	SUNS/BULLS	149
80	03/15/13	WHITE SOX PRESEASON	3:00 PM	CUBS/WHITE SOX	210
81	03/17/13	CUBS PRESEASON	4:00 PM	CUBS/OAKLAND	197
82	03/23/13	BULLS BASKETBALL	7:57 PM	PACERS/BULLS	165
83	03/23/13	CUBS PRESEASON	4:00 PM	ANAHEIM/CUBS	186
84	03/31/13	BULLS BASKETBALL	7:00 PM	PISTONS/BULLS	163
85	04/01/13	CUBS BASEBALL	1:30 PM	CUBS/PIRATES	201
86	04/03/13	WHITE SOX BASEBALL	2:00 PM	ROYALS/WHITE SOX	186
87	04/04/13	CUBS BASEBALL	12:30 PM	CUBS/PIRATES	173
88	04/06/13	CUBS BASEBALL	7:00 PM	CUBS/BRAVES	210
89	04/07/13	WHITE SOX BASEBALL	1:58 PM	MARINERS/WHITE/SOX	194
90	04/08/13	CUBS BASEBALL	1:57 PM	BREWERS/CUBS	241
91	04/09/13	CUBS BASEBALL	8:00 PM	BREWERS/CUBS	196
92	04/12/13	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/INDIANS	155
93	04/14/13	CUBS BASEBALL	2:09 PM	GIANTS/CUBS	260
94	04/18/13	CUBS BASEBALL	2:10 PM	RANGERS/CUBS	180

Appendix O: 154 Sports Broadcasts Missing from the Gray WGNA data 2010-2013

95	04/21/13	WHITE SOX BASEBALL	1:59 PM	TWINS/WHITE SOX	196
96	04/23/13	CUBS BASEBALL	7:00 PM	CUBS/REDS	205
97	04/24/13	WHITE SOX BASEBALL	2:00 PM	INDIANS/WHITE SOX	202
98	04/26/13	CUBS BASEBALL	7:00 PM	CUBS/MARLINS	180
99	04/28/13	WHITE SOX BASEBALL	1:58 PM	DEVIL RAYS/WHITE SOX	208
100	05/04/13	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/ROYALS	159
101	05/05/13	CUBS BASEBALL	2:10 PM	REDS/CUBS	227
102	05/07/13	CUBS BASEBALL	8:00 PM	CARDINALS/CUBS	174
103	05/10/13	CUBS BASEBALL	7:00 PM	CUBS/NATIONALS	158
104	05/11/13	WHITE SOX BASEBALL	7:00 PM	ANGELS/WHITE SOX	196
105	05/12/13	CUBS BASEBALL	1:25 PM	CUBS/NATIONALS	188
106	05/15/13	WHITE SOX BASEBALL	1:00 PM	WHITE SOX/TWINS	223
107	05/17/13	CUBS BASEBALL	2:10 PM	METS/CUBS	194
108	05/19/13	CUBS BASEBALL	2:10 PM	METS/CUBS	197
109	05/22/13	CUBS BASEBALL	7:00 PM	CUBS/PIRATES	190
110	05/25/13	CUBS BASEBALL	4:00 PM	CUBS/REDS	219
111	05/26/13	WHITE SOX BASEBALL	1:58 PM	MARLINS/WHITE SOX	184
112	05/27/13	WHITE SOX BASEBALL	7:00 PM	CUBS/WHITE SOX	166
113	05/29/13	WHITE SOX BASEBALL	2:14 PM	WHITE SOX/CUBS	206
114	05/30/13	CUBS BASEBALL	2:13 PM	WHITE SOX/CUBS	195
115	05/31/13	WHITE SOX BASEBALL	10:00 PM	WHITE SOX/ATHLETICS	150
116	06/02/13	CUBS BASEBALL	2:10 PM	DIAMONDBACKS/CUBS	230
117	06/04/13	CUBS BASEBALL	10:00 PM	CUBS/ANGELS	197
118	06/05/13	WHITE SOX BASEBALL	3:27 PM	WHITE SOX/MARINERS	363
119	06/07/13	CUBS BASEBALL	2:11 PM	PIRATES/CUBS	208
120	06/09/13	CUBS BASEBALL	2:10 PM	PIRATES/CUBS	199
121	06/20/13	CUBS BASEBALL	8:00 PM	CUBS/CARDINALS	206
122	06/22/13	CUBS BASEBALL	3:59 PM	ASTROS/CUBS	195
123	06/23/13	WHITE SOX BASEBALL	1:58 PM	WHITE SOX/ROYALS	225
124	06/26/13	CUBS BASEBALL	8:00 PM	CUBS/BREWERS	213
125	07/07/13	CUBS BASEBALL	2:11 PM	PIRATES/CUBS	242
126	07/12/13	CUBS BASEBALL	4:00 PM	CARDINALS/CUBS	192
127	07/26/13	CUBS BASEBALL	10:10 PM	CUBS/GIANTS	206
128	07/28/13	CUBS BASEBALL	4:00 PM	CUBS/GIANTS	181
129	07/31/13	CUBS BASEBALL	8:00 PM	BREWERS/CUBS	110
130	07/31/13	CUBS BASEBALL	10:56 PM	BREWERS/CUBS	71
131	08/02/13	CUBS BASEBALL	4:00 PM	DODGERS/CUBS	219
132	08/03/13	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/TIGERS	170
133	08/04/13	CUBS BASEBALL	2:10 PM	DODGERS/CUBS	205
134	08/09/13	CUBS BASEBALL	8:07 PM	CUBS/CARDINALS	209
135	08/10/13	CUBS BASEBALL	7:08 PM	CUBS/CARDINALS	202
136	08/11/13	CUBS BASEBALL	2:08 PM	CUBS/CARDINALS	239
137	08/14/13	CUBS BASEBALL	2:09 PM	REDS/CUBS	170
138	08/17/13	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/TWINS	187

Appendix O: 154 Sports Broadcasts Missing from the Gray WGNA data 2010-2013

139	08/18/13	CUBS BASEBALL	2:09 PM	CARDINALS/CUBS	211
140	08/21/13	CUBS BASEBALL	8:00 PM	NATIONALS/CUBS	219
141	08/22/13	CUBS BASEBALL	2:15 PM	NATIONALS/CUBS	8
142	08/22/13	CUBS BASEBALL	4:18 PM	NATIONALS/CUBS	252
143	08/24/13	CUBS BASEBALL	8:27 PM	CUBS/PADRES	180
144	08/25/13	CUBS BASEBALL	4:00 PM	CUBS/PADRES	327
145	08/27/13	CUBS BASEBALL	10:00 PM	CUBS/DODGERS	222
146	08/30/13	CUBS BASEBALL	2:13 PM	PHILLIES/CUBS	195
147	08/31/13	WHITE SOX BASEBALL	7:00 PM	WHITE SOX/RED SOX	213
148	09/01/13	CUBS BASEBALL	2:09 PM	PHILLIES/CUBS	206
149	09/06/13	CUBS BASEBALL	2:11 PM	BREWERS/CUBS	195
150	09/11/13	CUBS BASEBALL	12:30 PM	CUBS/REDS	196
151	09/12/13	CUBS BASEBALL	7:00 PM	CUBS/PIRATES	167
152	09/15/13	CUBS BASEBALL	1:28 PM	CUBS/PIRATES	181
153	09/19/13	CUBS BASEBALL	2:00 PM	CUBS/BREWERS	187
154	09/28/13	CUBS BASEBALL	4:08 PM	CUBS/CARDINALS	193

Appendix P: Top 100 Distant Viewing Records in Gray Data Non-WGN 2010-2013

Top 100 Distant Viewing Records in Gray Data 2010 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2010 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2010 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2011 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2011 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2011 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2012 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2012 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2012 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2013 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2013 Non-WGN

[redacted]

Top 100 Distant Viewing Records in Gray Data 2013 Non-WGN

[redacted]

Appendix Q

Distant Subscribers and Total Fees Generated by Stratum & WGN

Gray Analysis Data 2010-13

	Gray stratum	WGN	distant subscribers	share	total fees gen	share	Gray Table 2 (as-is) Distant Viewing	share
2010	1	0	1,445,366	1.98%	3,180,769	1.91%	1,286,000,410	14.20%
	2	0	4,030,106	5.52%	6,070,603	3.65%	1,811,611,984	20.00%
	3	0	5,969,558	8.18%	6,982,993	4.20%	1,354,045,084	14.95%
	4	0	10,810,513	14.81%	13,186,973	7.93%	2,041,904,020	22.55%
	5	0	9,374,699	12.84%	14,072,678	8.46%	1,275,804,452	14.09%
	5	1	41,361,722	56.67%	122,887,635	73.86%	1,286,562,581	14.21%
			72,991,964	**100%**	**166,381,651**	**100%**	**9,055,928,531**	**100%**
2011	1	0	1,489,688	1.99%	3,317,685	1.86%	1,218,171,794	15.98%
	2	0	3,999,857	5.33%	6,306,152	3.54%	1,084,828,021	14.23%
	3	0	5,645,924	7.53%	6,835,934	3.84%	1,147,446,915	15.05%
	4	0	11,587,359	15.44%	16,041,463	9.00%	1,766,613,132	23.17%
	5	0	9,198,632	12.26%	14,073,239	7.90%	1,227,053,933	16.09%
	5	1	43,106,794	57.45%	131,624,142	73.86%	1,181,259,971	15.49%
			75,028,254	**100%**	**178,198,615**	**100%**	**7,625,373,766**	**100%**
2012	1	0	1,277,911	1.75%	2,679,515	1.46%	1,271,078,115	16.29%
	2	0	3,176,480	4.36%	6,038,808	3.29%	1,570,505,861	20.12%
	3	0	4,591,465	6.30%	5,950,289	3.24%	1,195,954,983	15.32%
	4	0	8,787,703	12.07%	11,382,424	6.20%	1,534,158,271	19.66%
	5	0	12,537,120	17.21%	19,152,396	10.43%	1,365,508,742	17.50%
	5	1	42,459,172	58.30%	138,360,810	75.37%	867,767,853	11.12%
			72,829,851	**100%**	**183,564,242**	**100%**	**7,804,973,825**	**100%**
2013	1	0	1,009,936	1.47%	2,677,044	1.42%	1,245,100,446	19.97%
	2	0	2,785,216	4.05%	5,868,635	3.10%	1,013,575,505	16.26%
	3	0	3,979,509	5.79%	5,688,210	3.01%	1,011,344,788	16.22%
	4	0	6,890,260	10.03%	8,522,677	4.51%	1,193,991,532	19.15%
	5	0	11,529,770	16.78%	19,280,837	10.20%	1,077,316,509	17.28%
	5	1	42,522,609	61.88%	146,992,072	77.76%	693,909,866	11.13%
			68,717,300	**100%**	**189,029,475**	**100%**	**6,235,238,646**	**100%**

Appendix Q

Distant Subscribers and Total Fees Generated by Stratum (No WGNA)

Gray Analysis Data 2010-13 - Excluding WGNA

	Gray stratum	WGN	distant subscribers	share	total fees gen	share	Gray Table 2 (as-is) Distant Viewing	share
2010	1	0	1,445,366	4.57%	3,180,769	7.31%	1,286,000,410	16.55%
	2	0	4,030,106	12.74%	6,070,603	13.96%	1,811,611,984	23.32%
	3	0	5,969,558	18.87%	6,982,993	16.06%	1,354,045,084	17.43%
	4	0	10,810,513	34.18%	13,186,973	30.32%	2,041,904,020	26.28%
	5	0	9,374,699	29.64%	14,072,678	32.36%	1,275,804,452	16.42%
	No WGNA							
			31,630,242	**100%**	**43,494,016**	**100%**	**7,769,365,950**	**100%**
2011	1	0	1,489,688	4.67%	3,317,685	7.12%	1,218,171,794	18.90%
	2	0	3,999,857	12.53%	6,306,152	13.54%	1,084,828,021	16.83%
	3	0	5,645,924	17.69%	6,835,934	14.68%	1,147,446,915	17.81%
	4	0	11,587,359	36.30%	16,041,463	34.44%	1,766,613,132	27.41%
	5	0	9,198,632	28.82%	14,073,239	30.22%	1,227,053,933	19.04%
	No WGNA							
			31,921,460	**100%**	**46,574,473**	**100%**	**6,444,113,795**	**100%**
2012	1	0	1,277,911	4.21%	2,679,515	5.93%	1,271,078,115	18.32%
	2	0	3,176,480	10.46%	6,038,808	13.36%	1,570,505,861	22.64%
	3	0	4,591,465	15.12%	5,950,289	13.16%	1,195,954,983	17.24%
	4	0	8,787,703	28.93%	11,382,424	25.18%	1,534,158,271	22.11%
	5	0	12,537,120	41.28%	19,152,396	42.37%	1,365,508,742	19.68%
	No WGNA							
			30,370,679	**100%**	**45,203,432**	**100%**	**6,937,205,972**	**100%**
2013	1	0	1,009,936	3.86%	2,677,044	6.37%	1,245,100,446	22.47%
	2	0	2,785,216	10.63%	5,868,635	13.96%	1,013,575,505	18.29%
	3	0	3,979,509	15.19%	5,688,210	13.53%	1,011,344,788	18.25%
	4	0	6,890,260	26.30%	8,522,677	20.27%	1,193,991,532	21.55%
	5	0	11,529,770	44.02%	19,280,837	45.87%	1,077,316,509	19.44%
	No WGNA							
			26,194,691	**100%**	**42,037,403**	**100%**	**5,541,328,780**	**100%**

Title Appendix R: Stata Poisson regression documentation

poisson postestimation — Postestimation tools for poisson

Description
Options for predict
Remarks and examples
Syntax for predict
Syntax for estat gof
Methods and formulas
Menu for predict
Menu for estat
Also see

Description

The following postestimation command is of special interest after `poisson`:

Command	Description
`estat gof`	goodness-of-fit test

`estat gof` is not appropriate after the `svy` prefix.

The following standard postestimation commands are also available:

Command	Description
`contrast`	contrasts and ANOVA-style joint tests of estimates
`estat ic`	Akaike's and Schwarz's Bayesian information criteria (AIC and BIC)
`estat summarize`	summary statistics for the estimation sample
`estat vce`	variance–covariance matrix of the estimators (VCE)
`estat (svy)`	postestimation statistics for survey data
`estimates`	cataloging estimation results
`forecast`[1]	dynamic forecasts and simulations
`lincom`	point estimates, standard errors, testing, and inference for linear combinations of coefficients
`linktest`	link test for model specification
`lrtest`[2]	likelihood-ratio test
`margins`	marginal means, predictive margins, marginal effects, and average marginal effects
`marginsplot`	graph the results from margins (profile plots, interaction plots, etc.)
`nlcom`	point estimates, standard errors, testing, and inference for nonlinear combinations of coefficients
`predict`	predictions, residuals, influence statistics, and other diagnostic measures
`predictnl`	point estimates, standard errors, testing, and inference for generalized predictions
`pwcompare`	pairwise comparisons of estimates
`suest`	seemingly unrelated estimation
`test`	Wald tests of simple and composite linear hypotheses
`testnl`	Wald tests of nonlinear hypotheses

[1] `forecast` is not appropriate with `mi` or `svy` estimation results.

[2] `lrtest` is not appropriate with `svy` estimation results.

Special-interest postestimation command

`estat gof` performs a goodness-of-fit test of the model. Both the deviance statistic and the Pearson statistic are reported. If the tests are significant, the Poisson regression model is inappropriate. Then you could try a negative binomial model; see [R] **nbreg**.

Syntax for predict

`predict` [*type*] *newvar* [*if*] [*in*] [, *statistic* `nooffset`]

statistic	Description
Main	
`n`	number of events; the default
`ir`	incidence rate
`pr(`*n*`)`	probability $\Pr(y_j = n)$
`pr(`*a*`,`*b*`)`	probability $\Pr(a \leq y_j \leq b)$
`xb`	linear prediction
`stdp`	standard error of the linear prediction
`score`	first derivative of the log likelihood with respect to $\mathbf{x}_j\boldsymbol{\beta}$

These statistics are available both in and out of sample; type `predict ... if e(sample) ...` if wanted only for the estimation sample.

Menu for predict

Statistics > Postestimation > Predictions, residuals, etc.

Options for predict

Main

`n`, the default, calculates the predicted number of events, which is $\exp(\mathbf{x}_j\boldsymbol{\beta})$ if neither `offset()` nor `exposure()` was specified when the model was fit; $\exp(\mathbf{x}_j\boldsymbol{\beta} + \text{offset}_j)$ if `offset()` was specified; or $\exp(\mathbf{x}_j\boldsymbol{\beta}) \times \text{exposure}_j$ if `exposure()` was specified.

`ir` calculates the incidence rate $\exp(\mathbf{x}_j\boldsymbol{\beta})$, which is the predicted number of events when exposure is 1. Specifying `ir` is equivalent to specifying `n` when neither `offset()` nor `exposure()` was specified when the model was fit.

`pr(`*n*`)` calculates the probability $\Pr(y_j = n)$, where *n* is a nonnegative integer that may be specified as a number or a variable.

`pr(`*a*`,`*b*`)` calculates the probability $\Pr(a \leq y_j \leq b)$, where *a* and *b* are nonnegative integers that may be specified as numbers or variables;

b missing ($b \geq .$) means $+\infty$;
`pr(20,.)` calculates $\Pr(y_j \geq 20)$;
`pr(20,`*b*`)` calculates $\Pr(y_j \geq 20)$ in observations for which $b \geq .$ and calculates $\Pr(20 \leq y_j \leq b)$ elsewhere.

`pr(.,`*b*`)` produces a syntax error. A missing value in an observation of the variable *a* causes a missing value in that observation for `pr(`*a*`,`*b*`)`.

`xb` calculates the linear prediction, which is $\mathbf{x}_j\boldsymbol{\beta}$ if neither `offset()` nor `exposure()` was specified; $\mathbf{x}_j\boldsymbol{\beta} + \text{offset}_j$ if `offset()` was specified; or $\mathbf{x}_j\boldsymbol{\beta} + \ln(\text{exposure}_j)$ if `exposure()` was specified; see `nooffset` below.

`stdp` calculates the standard error of the linear prediction.

`score` calculates the equation-level score, $\partial \ln L/\partial(\mathbf{x}_j\boldsymbol{\beta})$.

`nooffset` is relevant only if you specified `offset()` or `exposure()` when you fit the model. It modifies the calculations made by `predict` so that they ignore the offset or exposure variable; the linear prediction is treated as $\mathbf{x}_j\boldsymbol{\beta}$ rather than as $\mathbf{x}_j\boldsymbol{\beta}+\text{offset}_j$ or $\mathbf{x}_j\boldsymbol{\beta}+\ln(\text{exposure}_j)$. Specifying `predict ..., nooffset` is equivalent to specifying `predict ..., ir`.

Syntax for estat gof

```
estat gof
```

Menu for estat

Statistics > Postestimation > Reports and statistics

Remarks and examples

stata.com

▷ Example 1

Continuing with example 2 of [R] **poisson**, we use `estat gof` to determine whether the model fits the data well.

```
. use http://www.stata-press.com/data/r13/dollhill3
. poisson deaths smokes i.agecat, exp(pyears) irr
  (output omitted)
. estat gof
         Deviance goodness-of-fit =  12.13244
         Prob > chi2(4)           =    0.0164
         Pearson goodness-of-fit  =  11.15533
         Prob > chi2(4)           =    0.0249
```

The deviance goodness-of-fit test tells us that, given the model, we can reject the hypothesis that these data are Poisson distributed at the 1.64% significance level. The Pearson goodness-of-fit test tells us that we can reject the hypothesis at the 2.49% significance level.

So let us now back up and be more careful. We can most easily obtain the incidence-rate ratios within age categories by using `ir`; see [ST] **epitab**:

```
. ir deaths smokes pyears, by(agecat) nohet
    age category |       IRR       [95% Conf. Interval]   M-H Weight
-----------------+-------------------------------------------------
           35-44 |   5.736638      1.463557   49.40468     1.472169 (exact)
           45-54 |   2.138812      1.173714   4.272545     9.624747 (exact)
           55-64 |    1.46824      .9863624   2.264107     23.34176 (exact)
           65-74 |    1.35606      .9081925   2.096412     23.25315 (exact)
           75-84 |   .9047304      .6000757   1.399687     24.31435 (exact)
-----------------+-------------------------------------------------
           Crude |   1.719823      1.391992    2.14353              (exact)
    M-H combined |   1.424682      1.154703   1.757784
```

We find that the mortality incidence ratios are greatly different within age category, being highest for the youngest categories and actually dropping below 1 for the oldest. (In the last case, we might argue that those who smoke and who have not died by age 75 are self-selected to be particularly robust.)

Seeing this, we will now parameterize the smoking effects separately for each category, although we will begin by constraining the smoking effects on third and fourth age categories to be equivalent:

```
. constraint 1 smokes#3.agecat = smokes#4.agecat
. poisson deaths c.smokes#agecat i.agecat, exposure(pyears) irr constraints(1)
Iteration 0:   log likelihood =  -31.95424
Iteration 1:   log likelihood = -27.796801
Iteration 2:   log likelihood = -27.574177
Iteration 3:   log likelihood = -27.572645
Iteration 4:   log likelihood = -27.572645
Poisson regression                              Number of obs   =         10
                                                Wald chi2(8)    =     632.14
Log likelihood = -27.572645                     Prob > chi2     =     0.0000
 ( 1)  [deaths]3.agecat#c.smokes - [deaths]4.agecat#c.smokes = 0
------------------------------------------------------------------------------
      deaths |        IRR   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      agecat#|
    c.smokes |
      35-44  |   5.736637   4.181256     2.40   0.017     1.374811    23.93711
      45-54  |   2.138812   .6520701     2.49   0.013     1.176691    3.887609
      55-64  |   1.412229   .2017485     2.42   0.016     1.067343    1.868557
      65-74  |   1.412229   .2017485     2.42   0.016     1.067343    1.868557
      75-84  |   .9047304   .1855513    -0.49   0.625     .6052658     1.35236
             |
      agecat |
      45-54  |    10.5631   8.067701     3.09   0.002     2.364153    47.19623
      55-64  |     47.671   34.37409     5.36   0.000     11.60056    195.8978
      65-74  |   98.22765   70.85012     6.36   0.000     23.89324    403.8244
      75-84  |   199.2099   145.3356     7.26   0.000     47.67693    832.3648
             |
       _cons |   .0001064   .0000753   -12.94   0.000     .0000266    .0004256
  ln(pyears) |          1  (exposure)
------------------------------------------------------------------------------
. estat gof
         Deviance goodness-of-fit =  .0774185
         Prob > chi2(1)           =    0.7808
         Pearson goodness-of-fit  =  .0773882
         Prob > chi2(1)           =    0.7809
```

The goodness-of-fit is now small; we are no longer running roughshod over the data. Let us now consider simplifying the model. The point estimate of the incidence-rate ratio for smoking in age category 1 is much larger than that for smoking in age category 2, but the confidence interval for `smokes#1.agecat` is similarly wide. Is the difference real?

```
. test smokes#1.agecat = smokes#2.agecat
 ( 1)  [deaths]1b.agecat#c.smokes - [deaths]2.agecat#c.smokes = 0
           chi2(  1) =    1.56
         Prob > chi2 =    0.2117
```

The point estimates of the incidence-rate ratio for smoking in the 35–44 age category is much larger than that for smoking in the 45–54 age category, but there is insufficient data, and we may be observing random differences. With that success, might we also combine the smokers in the third and fourth categories with those in the first and second categories?

```
. test smokes#2.agecat = smokes#3.agecat, accum

 ( 1)  [deaths]1b.agecat#c.smokes - [deaths]2.agecat#c.smokes = 0
 ( 2)  [deaths]2.agecat#c.smokes - [deaths]3.agecat#c.smokes = 0

           chi2(  2) =    4.73
         Prob > chi2 =    0.0938
```

Combining the first four categories may be overdoing it—the 9.38% significance level is enough to stop us, although others may disagree.

Thus we now fit our final model:

```
. constraint 2 smokes#1.agecat = smokes#2.agecat

. poisson deaths c.smokes#agecat i.agecat, exposure(pyears) irr constraints(1/2)

Iteration 0:   log likelihood = -31.550722
Iteration 1:   log likelihood = -28.525057
Iteration 2:   log likelihood = -28.514535
Iteration 3:   log likelihood = -28.514535

Poisson regression                                      Number of obs   =         10
                                                        Wald chi2(7)    =     642.25
Log likelihood = -28.514535                             Prob > chi2     =     0.0000

 ( 1)  [deaths]3.agecat#c.smokes - [deaths]4.agecat#c.smokes = 0
 ( 2)  [deaths]1b.agecat#c.smokes - [deaths]2.agecat#c.smokes = 0
```

deaths	IRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
agecat#						
c.smokes						
35-44	2.636259	.7408403	3.45	0.001	1.519791	4.572907
45-54	2.636259	.7408403	3.45	0.001	1.519791	4.572907
55-64	1.412229	.2017485	2.42	0.016	1.067343	1.868557
65-74	1.412229	.2017485	2.42	0.016	1.067343	1.868557
75-84	.9047304	.1855513	-0.49	0.625	.6052658	1.35236
agecat						
45-54	4.294559	.8385329	7.46	0.000	2.928987	6.296797
55-64	23.42263	7.787716	9.49	0.000	12.20738	44.94164
65-74	48.26309	16.06939	11.64	0.000	25.13068	92.68856
75-84	97.87965	34.30881	13.08	0.000	49.24123	194.561
_cons	.0002166	.0000652	-28.03	0.000	.0001201	.0003908
ln(pyears)	1	(exposure)				

The above strikes us as a fair representation of the data. The probabilities of observing the deaths seen in these data are estimated using the following `predict` command:

```
. predict p, pr(0, deaths)
. list deaths p
```

	deaths	p
1.	32	.6891766
2.	104	.4456625
3.	206	.5455328
4.	186	.4910622
5.	102	.5263011
6.	2	.227953
7.	12	.7981917
8.	28	.4772961
9.	28	.6227565
10.	31	.5475718

The probability $\Pr(y \leq \texttt{deaths})$ ranges from 0.23 to 0.80.

◁

Methods and formulas

In the following, we use the same notation as in [R] **poisson**.

The equation-level scores are given by

$$\text{score}(\mathbf{x}\boldsymbol{\beta})_j = y_j - e^{\xi_j}$$

The deviance (D) and Pearson (P) goodness-of-fit statistics are given by

$$\ln L_{\max} = \sum_{j=1}^{n} w_j \left[-y_j\{\ln(y_j) - 1\} - \ln(y_j!)\right]$$

$$\chi^2_D = -2\{\ln L - \ln L_{\max}\}$$

$$\chi^2_P = \sum_{j=1}^{n} \frac{w_j(y_j - e^{\xi_j})^2}{e^{\xi_j}}$$

Also see

[R] **poisson** — Poisson regression

[U] **20 Estimation and postestimation commands**

Appendix S: Dr. Gray Table 2 Shares for WGNA (Actual, Predicted and Corrected)

[redacted]

Appendix T: Tests of Robustness and Bias of Gray's Table 2 (Including Missing WGNA sports)

		2010			2011			2012			2013	
		distant viewing	share		distant viewing	share		distant viewing	share		distant viewing	share
cap= 1.00	can	151,090,777	2.10%	can	255,228,791	3.61%	can	253,509,267	3.53%	can	244,813,828	5.57%
	com	1,468,763,085	20.45%	com	1,416,821,395	20.05%	com	1,628,520,963	22.65%	com	857,828,449	19.51%
	dev	101,666,605	1.42%	dev	113,236,428	1.60%	dev	59,315,591	0.83%	dev	30,524,808	0.69%
	ps	3,064,493,325	42.67%	ps	2,844,275,364	40.25%	ps	2,296,891,021	31.95%	ps	1,485,002,307	33.78%
	public	1,821,254,067	25.36%	public	1,750,923,297	24.78%	public	2,339,958,469	32.55%	public	1,186,639,141	26.99%
	sports	574,997,813	8.01%	sports	685,412,534	9.70%	sports	611,296,374	8.50%	sports	591,292,682	13.45%
		7,182,265,672	**100%**		**7,065,897,809**	**100%**		**7,189,491,685**	**100%**		**4,396,101,215**	**100%**
cap= 0.50	can	142,577,940	2.35%	can	239,575,989	3.76%	can	243,516,369	4.20%	can	240,727,167	6.32%
	com	1,252,689,334	20.65%	com	1,280,389,505	20.07%	com	1,301,451,923	22.45%	com	780,530,009	20.49%
	dev	88,755,306	1.46%	dev	98,622,344	1.55%	dev	42,936,836	0.74%	dev	24,711,400	0.65%
	ps	2,527,797,027	41.68%	ps	2,482,650,415	38.92%	ps	1,776,653,676	30.65%	ps	1,196,845,705	31.42%
	public	1,505,453,742	24.82%	public	1,626,904,659	25.50%	public	1,855,558,605	32.02%	public	1,006,739,959	26.43%
	sports	547,862,803	9.03%	sports	651,024,944	10.21%	sports	575,716,895	9.93%	sports	559,710,651	14.69%
		6,065,136,152	**100%**		**6,379,167,856**	**100%**		**5,795,834,304**	**100%**		**3,809,264,891**	**100%**
cap= 0.30	can	126,575,874	2.58%	can	205,337,873	3.98%	can	228,212,195	4.85%	can	222,548,085	6.72%
	com	1,055,506,095	21.49%	com	1,104,068,410	21.38%	com	1,068,238,448	22.70%	com	712,870,105	21.54%
	dev	75,288,323	1.53%	dev	74,521,676	1.44%	dev	30,953,425	0.66%	dev	20,870,068	0.63%
	ps	1,994,787,156	40.62%	ps	1,862,866,668	36.08%	ps	1,367,322,347	29.06%	ps	970,035,070	29.31%
	public	1,141,881,954	23.25%	public	1,322,660,629	25.62%	public	1,468,477,247	31.21%	public	871,702,320	26.34%
	sports	516,922,655	10.53%	sports	593,432,009	11.49%	sports	542,468,998	11.53%	sports	511,931,408	15.47%
		4,910,962,057	**100%**		**5,162,887,265**	**100%**		**4,705,672,660**	**100%**		**3,309,957,056**	**100%**
cap= 0.20	can	109,858,872	2.71%	can	171,807,285	4.21%	can	203,055,338	5.20%	can	203,724,087	7.09%
	com	924,386,070	22.81%	com	968,337,049	23.71%	com	925,006,348	23.71%	com	660,895,950	22.99%
	dev	65,643,122	1.62%	dev	54,583,111	1.34%	dev	23,904,022	0.61%	dev	16,554,252	0.58%
	ps	1,589,842,776	39.23%	ps	1,329,484,183	32.55%	ps	1,076,679,861	27.59%	ps	779,843,633	27.13%
	public	865,757,711	21.36%	public	1,008,876,345	24.70%	public	1,164,434,272	29.84%	public	736,048,390	25.61%
	sports	496,938,021	12.26%	sports	550,887,517	13.49%	sports	509,002,158	13.04%	sports	477,457,420	16.61%
		4,052,426,572	**100%**		**4,083,975,490**	**100%**		**3,902,081,999**	**100%**		**2,874,523,732**	**100%**
cap= 0.10	can	76,504,782	2.68%	can	114,787,488	4.20%	can	135,958,501	5.13%	can	144,023,599	6.80%
	com	769,718,136	26.98%	com	809,283,279	29.60%	com	758,277,223	28.60%	com	584,001,153	27.55%
	dev	48,880,691	1.71%	dev	34,452,495	1.26%	dev	14,055,066	0.53%	dev	9,743,110	0.46%
	ps	985,704,115	34.55%	ps	707,363,914	25.87%	ps	611,318,775	23.06%	ps	501,592,403	23.67%
	public	504,340,418	17.68%	public	566,442,980	20.72%	public	665,347,215	25.09%	public	438,861,026	20.71%
	sports	468,038,290	16.40%	sports	501,931,752	18.36%	sports	466,470,236	17.59%	sports	441,328,720	20.82%
		2,853,186,432	**100%**		**2,734,261,908**	**100%**		**2,651,427,016**	**100%**		**2,119,550,011**	**100%**
cap= 0.05	can	47,835,490	2.23%	can	71,365,019	3.58%	can	80,876,294	4.30%	can	84,162,139	5.43%
	com	684,317,708	31.88%	com	730,290,748	36.65%	com	667,073,472	35.48%	com	529,342,390	34.14%
	dev	38,926,285	1.81%	dev	25,770,421	1.29%	dev	8,500,651	0.45%	dev	5,011,846	0.32%
	ps	652,064,622	30.38%	ps	390,273,891	19.58%	ps	344,902,647	18.35%	ps	288,439,791	18.60%
	public	272,302,486	12.69%	public	296,162,853	14.86%	public	334,949,992	17.82%	public	225,218,951	14.53%
	sports	451,112,838	21.02%	sports	478,977,691	24.03%	sports	443,633,590	23.60%	sports	418,276,993	26.98%
		2,146,559,429	**100%**		**1,992,840,623**	**100%**		**1,879,936,646**	**100%**		**1,550,452,110**	**100%**
cap= 0.02	can	19,365,815	1.26%	can	29,852,763	1.96%	can	36,848,231	2.62%	can	38,199,670	3.21%
	com	577,549,044	37.66%	com	685,050,333	45.09%	com	616,846,330	43.85%	com	497,853,860	41.77%
	dev	30,763,282	2.01%	dev	21,144,013	1.39%	dev	5,523,677	0.39%	dev	2,155,832	0.18%
	ps	396,855,777	25.88%	ps	204,727,203	13.47%	ps	186,371,191	13.25%	ps	162,082,570	13.60%
	public	109,743,050	7.16%	public	118,987,530	7.83%	public	131,166,782	9.33%	public	89,833,167	7.54%
	sports	399,277,249	26.04%	sports	459,678,947	30.25%	sports	429,824,167	30.56%	sports	401,740,106	33.71%
		1,533,554,217	**100%**		**1,519,440,789**	**100%**		**1,406,580,378**	**100%**		**1,191,865,205**	**100%**

Appendix T: Tests of Robustness and Bias of Gray's Table 2 (Including Missing WGNA sports)

		2010-2013	
		distant viewing	share
cap= 1.00	can	904,642,663	3.50%
	com	5,371,933,892	20.79%
	dev	304,743,432	1.18%
	ps	9,690,662,017	37.51%
	public	7,098,774,974	27.48%
	sports	2,462,999,403	9.53%
		25,833,756,381	**100%**
cap= 0.50	can	866,397,465	3.93%
	com	4,615,060,771	20.93%
	dev	255,025,886	1.16%
	ps	7,983,946,823	36.21%
	public	5,994,656,965	27.19%
	sports	2,334,315,293	10.59%
		22,049,403,203	**100%**
cap= 0.30	can	782,674,027	4.33%
	com	3,940,683,058	21.78%
	dev	201,633,492	1.11%
	ps	6,195,011,241	34.25%
	public	4,804,722,150	26.56%
	sports	2,164,755,070	11.97%
		18,089,479,038	**100%**
cap= 0.20	can	688,445,582	4.62%
	com	3,478,625,417	23.33%
	dev	160,684,507	1.08%
	ps	4,775,850,453	32.02%
	public	3,775,116,718	25.31%
	sports	2,034,285,116	13.64%
		14,913,007,793	**100%**
cap= 0.10	can	471,274,370	4.55%
	com	2,921,279,791	28.20%
	dev	107,131,362	1.03%
	ps	2,805,979,207	27.09%
	public	2,174,991,639	21.00%
	sports	1,877,768,998	18.13%
		10,358,425,367	**100%**
cap= 0.05	can	284,238,942	3.75%
	com	2,611,024,318	34.49%
	dev	78,209,203	1.03%
	ps	1,675,680,951	22.14%
	public	1,128,634,282	14.91%
	sports	1,792,001,112	23.67%
		7,569,788,808	**100%**
cap= 0.02	can	124,266,479	2.20%
	com	2,377,299,567	42.07%
	dev	59,586,804	1.05%
	ps	950,036,741	16.81%
	public	449,730,529	7.96%
	sports	1,690,520,469	29.91%
		5,651,440,589	**100%**

Appendix U: Correcting Gray Errors and Using Gray 2017 Methodology

		Gray April 3 2017 Original Methodology (3 Errors)		Use Original Methodology Gray Fixes 2 Errors		Use Original Methodology Fixing 3 Errors		
Distant Viewing		Unwgt NPM counts		Unwgt NPM counts		Unwgt NPM counts		
Regressions:		One Regression		One Regression		One Regression		
Data changes:		Old WGNA, Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Include Missing WGNA Sports		
		Original 2017 (with 3 Errors)		Fix 2 Errors (per Gary 2018 Testimony)		Fix 3 Errors		
		distant viewing	Share	distant viewing	Share	distant viewing	Share	Difference Fix 3 Errors - Original
2010	can	22,577	1.96%	26,229	2.73%	26,229	2.72%	**0.76%**
	com	181,958	15.83%	204,987	21.30%	204,987	21.26%	**5.43%**
	dev	13,598	1.18%	20,649	2.15%	20,649	2.14%	**0.96%**
	ps	585,521	50.94%	387,286	40.24%	387,286	40.16%	**-10.78%**
	public	321,335	27.96%	238,045	24.73%	238,045	24.69%	**-3.27%**
	sports	24,466	2.13%	85,241	8.86%	87,073	9.03%	**6.90%**
		1,149,455	**100%**	**962,437**	**100%**	**964,269**	**100%**	
2011	can	39,472	3.93%	42,965	5.25%	42,965	5.23%	**1.30%**
	com	121,186	12.06%	177,014	21.61%	177,014	21.55%	**9.49%**
	dev	24,497	2.44%	14,415	1.76%	14,415	1.75%	**-0.68%**
	ps	501,580	49.92%	273,993	33.45%	273,993	33.35%	**-16.57%**
	public	292,267	29.09%	225,836	27.57%	225,836	27.49%	**-1.60%**
	sports	25,803	2.57%	84,873	10.36%	87,326	10.63%	**8.06%**
		1,004,805	**100%**	**819,096**	**100%**	**821,549**	**100%**	
2012	can	37,007	3.58%	47,583	6.23%	47,583	5.97%	**2.38%**
	com	159,938	15.48%	177,658	23.27%	177,658	22.28%	**6.79%**
	dev	11,032	1.07%	5,910	0.77%	5,910	0.74%	**-0.33%**
	ps	373,313	36.14%	220,592	28.89%	220,592	27.66%	**-8.48%**
	public	430,093	41.64%	265,914	34.83%	265,914	33.34%	**-8.29%**
	sports	21,596	2.09%	45,849	6.01%	79,853	10.01%	**7.92%**
		1,032,979	**100%**	**763,506**	**100%**	**797,510**	**100%**	
2013	can	38,340	5.16%	44,370	7.41%	44,370	6.96%	**1.80%**
	com	78,754	10.61%	122,645	20.49%	122,645	19.24%	**8.63%**
	dev	8,160	1.10%	4,736	0.79%	4,736	0.74%	**-0.36%**
	ps	334,733	45.09%	197,494	33.00%	197,494	30.98%	**-14.10%**
	public	247,143	33.29%	182,763	30.54%	182,763	28.67%	**-4.62%**
	sports	35,303	4.76%	46,517	7.77%	85,445	13.40%	**8.65%**
		742,433	**100%**	**598,525**	**100%**	**637,453**	**100%**	

Appendix U: Correcting Gray Errors and Using Gray 2017 Methodology

		Gray April 3 2017 Original Methodology (3 Errors)		Use Original Methodology Gray Fixes 2 Errors		Use Original Methodology Fixing 3 Errors		
Distant Viewing		Unwgt NPM counts		Unwgt NPM counts		Unwgt NPM counts		
Regressions:		One Regression		One Regression		One Regression		
Data changes:		Old WGNA, Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Missing WGNA Sports		New WGNA, fix Canadian Sports Error, & Include Missing WGNA Sports		
		Original 2017 (with 3 Errors)		Fix 2 Errors (per Gary 2018 Testimony)		Fix 3 Errors		
		distant viewing	Share	distant viewing	Share	distant viewing	Share	Difference Fix 3 Errors - Original
2010-2013	can	137,396	3.50%	161,147	5.13%	161,147	5.00%	**1.51%**
	com	541,836	13.79%	682,304	21.70%	682,304	21.18%	**7.40%**
	dev	57,287	1.46%	45,710	1.45%	45,710	1.42%	**-0.04%**
	ps	1,795,147	45.68%	1,079,365	34.34%	1,079,365	33.51%	**-12.17%**
	public	1,290,838	32.85%	912,558	29.03%	912,558	28.33%	**-4.52%**
	sports	107,168	2.73%	262,480	8.35%	339,697	10.55%	**7.82%**
		3,929,672	**100%**	**3,143,564**	**100%**	**3,220,781**	**100%**	

EXHIBIT C

Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

	)	
In re	)	
	)	
DISTRIBUTION OF CABLE ROYALTY FUNDS	)	**NO. 14-CRB-0010-CD (2010-13)**
	)	
	)	

Written Rebuttal Testimony of

Susan Nathan

September 15, 2017

Corrected October 5, 2017

Amended February 12, 2018

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I. Qualifications:

I have over thirty years of experience with media research, including service as Senior Vice President, Affiliate Research, Media Currency & Research Operations at Turner Broadcasting (2009-14); Vice President, Media Currency, at Turner Broadcasting (2007-09); Senior Vice President, Director of Media Knowledge at Universal McCann (1991-2007); Senior Vice President, Director of Media Research, at Laurence, Charles, Free & Lawson; and Vice President, and Director of Media Research, Needham, Harper Worldwide. As a senior media researcher, I have been responsible for being an expert on all issues regarding measurement of audiences across all media. My primary area of expertise is television research, including the collection and use of television audience data.

I have worked with The Nielsen Company (Nielsen) throughout my career. My first job in the industry was at Nielsen, where I learned the importance of sophisticated sampling procedures, which are critical for a rating service whose business depends on accuracy and reliability. As a client of Nielsen, I was heavily involved on behalf of my employers and our respective clients in all methodology issues involving national and local television measurement. In my role as a research director at the agencies and at Turner, I was responsible for training other employees concerning Nielsen data and how to ensure the proper use of that data.

I am a long-standing member of the Media Ratings Council (MRC), having first joined the non-profit organization in 1990 as one of the original agency representatives. The MRC (formerly the Broadcast Ratings Council) is a government-sanctioned group that audits and accredits research services for the media industry.[1] Its membership consists of top researchers across the industry including broadcast networks, local stations, advertisers, agencies, cable networks, media companies and industry associations. Nielsen's national and local audience

[1] See http://mediaratingcouncil.org/.

measurement services are among the many research services that undergo extensive audits conducted by independent auditors and evaluated by MRC committee members who subsequently vote on accreditation of such services. I was an active member of the MRC, having served on the TV, Print, Out-of-Home and Digital Committees as well as on the Board of Directors. I also served one term as Chair of the MRC Board.

A more detailed description of my qualifications is set forth in Appendix A.

II. Introduction and Summary

The Joint Sports Claimants asked that I review the testimony Dr. Jeffrey Gray submitted in this proceeding on behalf of the Program Suppliers.[2] Dr. Gray sought to estimate what he termed the "distant viewing levels and shares" of different categories of programming during the years 2010-13.[3] It is not entirely clear, from a review of Dr. Gray's written testimony alone, what he considers "distant viewing" to mean. However, as I understand it, Dr. Gray sought to estimate distant viewing by counting the number of Nielsen National People Meter (NPM) cable households that viewed all or any portion of each quarter-hour of programming on particular out-of-market broadcast stations.[4]

Dr. Gray has submitted two different versions of his analysis using different data sets and different methodologies. The first version — contained in Dr. Gray's amended March 9, 2017 and corrected April 3, 2017 written direct testimony (referred to herein as "First Version") — used raw NPM household counts and did not apply any Nielsen weighting to project the NPM households to the total universe. As Dr. Gray subsequently acknowledged, the First Version also omitted substantial NPM data for WGNA, the largest distantly transmitted station. In the second

[2] See Testimony of Jeffrey S. Gray, Ph.D. (Corrected April 3, 2017).
[3] See *Id.* p. 19, Table 2.
[4] See *Id.* at p. 19, Table 2. The industry typically defines viewership of a program as the number of households tuned to the average minute of said program – and most importantly is based on the projected sample as opposed to an individual NPM household.

version of his analysis — contained in Dr. Gray's corrected January 22, 2018 written direct testimony ("Second Version")[5], Dr. Gray purports to have included the previously omitted WGNA data. In addition, he applies what he says are NPM weights provided by Mr. Lindstrom.[6]

I believe that Dr. Gray's estimates of "distant viewing" are unreliable and invalid for at least two reasons. As an initial matter, both the First Version and the Second Version are based solely upon data from Nielsen's NPM service. That service, however, is designed to measure only nationwide viewing for nationally televised programs; it cannot properly be used to estimate viewing in particular markets, primarily because of sampling design and sample size limitations. This problem infects both the First Version and Second Version. Second, Dr. Gray does not use appropriate weights to project from the raw NPM household data to the total universe. In the First Version, Dr. Gray erred by using the raw count of NPM households without applying any weighting to account for how those households relate to the particular distant signal markets he analyzed. In the Second Version, Dr. Gray errs by applying Nielsen's national NPM weights, which are meant to project the NPM households to represent nationwide viewing levels and cannot reliably project the NPM households to distant viewing levels in particular markets. Such national weighting is not appropriate for estimating non-national distant viewing. It is not possible to make reliable projections without using the appropriate weights.

[5] Testimony of Jeffrey S. Gray, Ph.D. (as corrected January 22, 2018). All cites to "Gray Testimony" apply to both his 2017 and 2018 Testimony, as the texts are largely similar.

[6] I also understand that Dr. Gray changed his methodology for his multiple regression analysis. Whereas in the first version of his report Dr. Gray applied a single multiple regression analysis to estimate "viewing", in the second version of his report Dr. Gray used a separate multiple regression analysis for WGNA. *See* Amended Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding, at p. 1-2 (Feb 12, 2018) (Amended Wecker Report).

In my opinion, one cannot reasonably consider the "viewing" estimates in Table 2 of Dr. Gray's testimony (the Initial Version or the Second Version) to reflect distant viewing by the universe of cable subscribers.

III. Nielsen Employs Different Samples and Methodologies to Measure National Viewing and Local Viewing

Nielsen offers different services to measure the audiences that watch television programming. One such service (NPM) measures national audiences that watch programming distributed nationally by national broadcast and cable networks and via syndication. Other services measure the audiences for programming televised by individual (local)broadcast stations.

A. National People Meter (NPM) Service

Nielsen's NPM service "provides estimates of in-home audiences of nationally televised programs" and is "based upon a national sample of U.S. television-equipped households."[7] Nielsen implemented the NPMs in 1987 as the method of collecting audience viewing data for all national television programming. The people meter is an electronic device that utilizes a meter attached to the TV set in combination with a remote control that has a button for each member of the sample household who is instructed to push his or her respective button when watching television. The meter automatically captures when the television set is on and the channel to which it is tuned while the remote captures the household member who is viewing. Previously Nielsen estimated national viewing using a combination of set meters which measured the on/off status of the television set as well as the channel tuned and length of that tune, with "diaries" where sample households wrote down the programs they watched and when they watched them. As cable penetration expanded in the 1980s, diaries were deemed unreliable

[7] Nielsen National Reference Supplement 2012-13 at 1-1, Bates No. PS-2010-13-C-004415-004607.

as a means of capturing viewing and thus Nielsen switched to people meters for national audience estimates. Since the latter captured viewing electronically, this change provided what Nielsen considered to be more accurate ratings estimates, especially for lower rated nationally-distributed cable networks.

During the years 2010-2013, the NPM sample consisted of approximately 22,000 households. Nielsen carefully selected the NPM sample to represent approximately 110,000,000 U.S. TV Households, approximately 60% of which subscribed to cable. In order for a sample that small to properly represent a constituency that large, special care must be given to sample selection, including (but not limited to): geographic distribution (to ensure all areas in the U.S. are represented); demographic distribution (age, gender, race, ethnicity, income, education, etc.); cable status; and presence of children. Nielsen employs sophisticated weighting schemes to lessen the chance of any bias in the NPM audience estimates. Each household is representative of a certain number of viewers. As Nielsen explains: "The weights measure the number of people in the population that are represented by each member of the sample. For example, if [a] sample member has a weight of 20,000 for a selected day, this means that on that day the sample member represents 20,000 in the population."[8] As this also suggests, the weight attached to each NPM household may vary on a daily basis.

Nielsen selected the NPM households to be representative of nationwide viewership of programming that is distributed nationally. These households were not selected to measure viewership in particular markets or portions of those markets; generally, there are insufficient participating NPM households in a given locality to measure local viewership. While there

8 https://audiencewatch.nielsen.com/data/help/Tutorial/Appendices/Weighted%20vs.%20Unweighted/weighted.htm

might be a people meter or two in a specific county, one could not properly use the viewing results from those people meters alone to estimate the local viewing in that county.

B. **Local Market Services**

Nielsen employs different samples when measuring local rather than national viewership. Nielsen uses three different methods for measuring local markets which vary depending on market size. There are a total of 210 local markets in the U.S., known as "Designated Market Areas" (DMAs). Nielsen assigns each county in the United States to one, and only one, DMA so that the DMAs are mutually exclusive and do not overlap. It also associates each broadcast television station with a single DMA.

1. **Local People Meters (Top 25 Markets)**

In the top 25 DMAs, Nielsen supplements the NPM households with additional people meters, known as Local People Meters (LPM), because there simply are not enough National People Meters in any market to measure local viewing in that market. For the largest markets (1-5) in 2010-2013, Nielsen added between 800 and 1000 additional households per market, and it added 600 per market for the remaining twenty markets. For each such market, Nielsen weighted the NPM sample households differently to be representative of the local market rather than the national market.

2. **Set Meters/Diaries (Markets 26-56)**

In the next largest group of DMAs (26-56) Nielsen utilized a combination of set meters (to gather household viewing) and diaries (to capture demographic viewing) during 2010-2013. The set meter is attached to the television and captures set on/off and channel tuned. The meters measure household viewing 24/7 passively. However, a completely different sample of homes fill out paper diaries which are only done for one week at a time during the sweep periods of February, May, July and November (note: the larger markets have three additional months of

measurement). The diaries are merged with the household tuning data from the set meters to project audience estimates in a process called meter/diary integration. Sample sizes vary by market.

3. Diaries (Market 57-210)

During 2010-2013, Nielsen used diaries in all non-LPM markets (as described above) but diaries were the sole source of audience measurement in markets 57-210. A completely separate sample is utilized in each of these markets and respondents are recruited to fill out one 7 day/24-hour diary per member of the recruited home during the sweep periods.

* * * * * * * *

All of the above methods employ varying design-specific weighting schemes to ensure proper representation. The importance of these design-specific statistical adjustment procedures cannot be underestimated as these adjustments are critical to the mitigation of bias in the projections.

IV. The Distant Viewing Estimates In The Gray Testimony (Table 2) Are Unreliable And Invalid

A. Misuse of National People Meter Data

I understand that, for each of the years 2010-2013, Dr. Gray selected a stratified random sample of approximately 150 broadcast television stations of the more than 1,000 stations that cable systems retransmitted outside the their local markets, *i.e.*, on a distant signal basis.[9] Nielsen then provided Dr. Gray with a custom report that was purported to show the number of NPM cable households tuned to all or any portion of a quarter hour of programming broadcast on the sample stations during 2010-2013 — broken down by the number of NPM households

[9] I understand that a broadcast station is generally considered to be a "distant signal" in geographic areas outside its local DMA; however, for purposes of these proceedings, the legal standard for determining distant signal status is not in all cases identical to the DMA.

located within counties that the Program Suppliers considered local for each such station (local NPM households) and NPM households outside those counties (distant NPM households).[10]

With regard to the First Version of Dr. Gray's analysis, for approximately 94 percent of the quarter hours on the sample of stations, Nielsen's custom report provided Dr. Gray with no data whatsoever as to viewing by distant NPM households; for the remaining quarter hours, the Nielsen custom report generally showed that no more than one or two NPM cable households viewed all or a portion of those quarter hours. Less than 0.01% of the quarter-hours showed viewing by more than five NPM cable households.[11]

These results are not surprising. As explained above, Nielsen designed the NPM service on which Dr. Gray relied, to measure national viewing of nationally-distributed programming, not to estimate the number of households that viewed a broadcast station's programming in any given market, local or distant. Thus, there were an insufficient and unrepresentative number of NPM households to measure viewing in each market; and, for all markets, the participating households were weighted in the NPM sample to be representative on a national rather than local level. Dr. Gray appears to recognize as much when he states that the "many instances of no recorded distant viewing" were "[d]ue to the low frequency of distant viewing and the size of the sample Nielsen uses to measure total U.S. household viewing …."[12] What he ignores, however, is that that the NPM sample was not intended to measure viewing in each separate market.

The one exception here involves viewing of programming on WGNA, which was included in each of Dr. Gray's 2010-2013 samples. Unlike the other sample stations, WGNA was nationally distributed and available to over 40 million cable households around the country

[10] See Gray Testimony at pp. 12-13; Testimony of Paul B. Lindstrom, at pp. 4-5 ("Lindstrom Testimony") (Dec. 22, 2016); Amended Wecker Report, at pp. 6, 12-13.
[11] See Amended Wecker Report at p. 15, Table 5.
[12] See Gray Testimony at p. 17.

in 2010-2013, and the NPM service should have been able to provide valid and reliable viewing estimates for WGNA. However, as I understand it, Nielsen's custom report used by Dr. Gray in the First Version of his analysis showed no data for the vast majority of quarter hours on WGNA and showed no more than one household as viewing each of the remaining quarter hours.[13] Indeed, according to the report, only one distant NPM household watched one minute of a single program (a Bulls telecast) during the year 2013. I would not have expected such results. And, in fact, they appear to be inconsistent with NPM viewing data that Nielsen has provided to other customers.[14]

I understand that the Second Version of Dr. Gray's analysis contained a much more robust dataset for WGNA than the First Version.[15] Apparently, Nielsen had not provided Dr. Gray with complete NPM data in the original data set used for the First Version of his report. However, the same issues found in the First Version regarding absent viewing data for non-WGNA stations remain in the dataset underlying the Second Version. For example, with regard to the non-WGNA stations, approximately 94 percent of the quarter hours on the sample stations, still show no data whatsoever as to viewing by distant NPM households.[16] And of the remaining 6 percent, the vast majority only have data from a single NPM household.

B. Misuse of Nielsen Weights

As explained above, Nielsen carefully weights each NPM household to ensure that the NPM data can properly be projected to the television universe; those weights are not all the same and weightings may change on a daily basis for individual NPM households. The weight of a

[13] See Amended Wecker Report at pp. 15-17.
[14] See Amended Wecker Report at pp. 17-18.
[15] See Amended Wecker Report at pp. 19-22.
[16] See Amended Wecker Report at pp. 22-23.

sample member equals the number of members of the population that the sample member represents. Nielsen sample weights are generally between 4,000 and 30,000.

In the First Version, Dr. Gray, in arriving at his distant viewing estimates, treats each NPM household as equal -- even though each NPM sample household is not equal in Nielsen's sample design. Rather, each household is representative of a different number of potential viewers. Simply estimating the number of sample participants that might view a given program is not an accurate means of estimating viewership. By ignoring the weighting and assuming one people meter household is the same as another, Gray uses the unweighted data in a manner for which it was not intended.

As I noted in my original written rebuttal testimony, Dr. Gray cannot solve the weighting issue simply by applying NPM weights. That is because the NPM weights are designed to project a given household to measurement of a national audience. However, much of the distant viewing that Dr. Gray is attempting to measure is not national in scope, and thus the NPM weights do not allow one to reliably project regional viewership of a regionally distributed program from the viewing behavior of a specific NPM household. In order to project from an NPM household to a non-national distant signal market, one would need, among other things, to utilize a market-specific weight for the household at issue. For example, in markets where Nielsen has Local People Meters, it uses weighting specific to the market for each home in the sample, even though some of the same homes are also used in the NPM sample. Nielsen does not apply the NPM weights to measure local viewing. This is not a trivial issue. Absent an appropriate weight, it is not possible to project from a specific household in the sample to the universe that one is trying to predict.

Nonetheless, in the Second Version of his viewing analysis, I understand that Dr. Gray applied the NPM weights rather than obtaining appropriate non-national weighting for the station

being measured.[17] The use of the NPM weights leads to impossible results and renders Dr. Gray's efforts to predict viewing unreliable. Consider the case of KUNW. This is a low power station in Yakima, Washington; in 2013 only 454 subscribers had access to KUNW as a distant signal. Thus, by definition, if every single subscriber was watching a given program at the same time (which in my experience is extremely unlikely), there could not be more than 454 distant cable households viewing that program. Yet, by using the NPM weights which are designed to project national viewership, Dr. Gray estimated that between 12,829 and 31,463 of such households viewed a given 15-minute segment of programming on KUNW.[18] Given that there are only 454 distant subscribers, Dr. Gray's weighted inputs for KUNW are impossible and overstate viewing on KUNW by at least 30 times over and likely more.

This issue is not limited to KUNW. For example, I understand that more than 22% of the stations included by Dr. Gray in his sample contain one or more instances in which the weighted viewing for a given 15 minute record of compensable viewing exceeds the total number of distant subscribers,[19] which again is simply not possible. Likewise, I understand that more than 18% of the stations included by Dr. Gray in his sample contain one or more instances in which the weighted viewing for a given 15 minute record of compensable viewing is between 50-100% of total subscribers.[20] This, too, is not possible. As a comparison, viewing of the Super Bowl, the #1 viewed program each year, is seen by only about 45% of television households. Still further, I understand that approximately 31% of the stations in Dr. Gray's sample contain at least one instance in which the weighted viewing for a given 15 minute record of compensable

[17] See Amended Wecker Report at pp. 31-32.
[18] See Amended Wecker Report at pp. 37-38.
[19] See Amended Wecker Report at p. 39.
[20] See Amended Wecker Report at p. 40.

viewing is between 20-50%,[21] again an either impossible or highly implausible outcome given that the most highly viewed sitcoms on the broadcast networks are watched by only about 8-9% of the potential audience. In sum, Dr. Gray's misapplication of NPM weights results in unreliable predictions of viewing for non-national distantly transmitted stations.

CONCLUSION

Based on my professional experience and expertise in television audience measurement, it is my opinion that both the First Version and the Second Version of Dr. Gray's study are methodologically flawed and should not be used in its present form. Dr. Gray uses the NPM sample for a purpose for which it was not intended and not capable of measuring—namely, non-national distant signal viewing. Dr. Gray further exacerbated the unreliability of his analysis by using weights meant for the NPM sample. The NPM weights can only be used to project national viewing and cannot provide reliable projections of non-national distant viewing. In order to estimate distant viewing, one would need to utilize weights specific to the market being analyzed.

[21] See Amended Wecker Report at p. 40, Table 19.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February__, 2018.

Susan Nathan

APPENDIX A

Susan Nathan Consultancy: January 2015-present

Susan uses her expertise in research and technical media issues to provide guidance and advice to organizations in the media industry.

Turner Broadcasting: August 2007-December 2014
Senior Vice President, Affiliate Research, Media Currency & Research Systems

Susan held a leadership role at Turner and was on the Executive Committee that oversaw the 180 Turner Researchers. She ran a successful team of research professionals and her varied responsibilities included:

Complete oversight of Turner Network Sales & Marketing research efforts which provided insight on audiences and industry trends, and oversaw the development of analyses and custom research to assist top management in setting strategy and goals for marketing Turner's networks to MVPDs;

All research activities for Turner's in-house media planning agency, Turner Media Group (TMG), including designing and conducting custom research on the effectiveness of off-air promotions as well as partnering with media sellers to develop key insights for the implementation of strategic media plans;

Ongoing research analysis and insights regarding advertising currencies, audience measurement initiatives and emerging industry and market trends in support of all Turner businesses. This specifically included expertise in all issues regarding Nielsen;

Management of all research systems utilized by Turner Research including the development of custom and proprietary modules to drive increased business for Turner;

Oversight of Turner's Media Lab facility in Atlanta utilized for focus groups and usability studies benefiting Turner and client businesses.

Other Professional Experience:

1991-2007	Senior Vice President, Director of Media Knowledge Universal McCann/McCann Erickson
1986-1991	Senior Vice President, Director of Media Research Laurence, Charles, Free & Lawson
1981-1986	Vice President, Director of Media Research Needham, Harper Worldwide

1978-1981	Network Negotiator
1977-1978	Senior Media Research Analyst William Esty Company
1974-1977	Account Group Manager A.C. Nielsen Company

Professional Associations

4A's Media Research Committee (member 1986-2007, former Chair)
AMRC – Agency Media Research Council (member 1981-2007, former Chair)
ARF – Advertising Research Foundation (member 1980-2014, former Subcommittee Chairperson)
CIMM – Coalition for Innovative Media Measurement (2009-2014)
MRC - Media Ratings Council (member 1990-2014, former Chair of the Board)
Nielsen Customer Expert Committee (2007-2014)
Nielsen Policy Guidelines Committee (1997-2005)

Susan has been very active in the media research community include being a long standing active member of the Media Rating Council including its Board of Directors and has served as Chair of the Board. In addition to the MRC, she served as Turner's representative on CIMM (Coalition for Innovative Media Measurement), CRE's RPD Committee, comScore's Cross Media Advisory Board, the CONCAM Technical Subcommittee, the IAB Research Council and several ARF committees.

Susan was also the former Chair of the 4A's Media Research Committee and the Agency Media Research Council from her days on the agency side of the business.

EXHIBIT D

Before the
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Washington, D.C.

	)	
In re	)	
	)	
DISTRIBUTION OF CABLE	)	**NO. 14-CRB-0010-CD (2010-13)**
ROYALTY FUNDS	)	
	)	

Written Rebuttal Testimony of

Susan Nathan

September 15, 2017

Corrected October 5, 2017

Amended February 12, 2018

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I. Qualifications:

I have over thirty years of experience with media research, including service as Senior Vice President, Affiliate Research, Media Currency & Research Operations at Turner Broadcasting (2009-14); Vice President, Media Currency, at Turner Broadcasting (2007-09); Senior Vice President, Director of Media Knowledge at Universal McCann (1991-2007); Senior Vice President, Director of Media Research, at Laurence, Charles, Free & Lawson; and Vice President, and Director of Media Research, Needham, Harper Worldwide. As a senior media researcher, I have been responsible for being an expert on all issues regarding measurement of audiences across all media. My primary area of expertise is television research, including the collection and use of television audience data.

I have worked with The Nielsen Company (Nielsen) throughout my career. My first job in the industry was at Nielsen, where I learned the importance of sophisticated sampling procedures, which are critical for a rating service whose business depends on accuracy and reliability. As a client of Nielsen, I was heavily involved on behalf of my employers and our respective clients in all methodology issues involving national and local television measurement. In my role as a research director at the agencies and at Turner, I was responsible for training other employees concerning Nielsen data and how to ensure the proper use of that data.

I am a long-standing member of the Media Ratings Council (MRC), having first joined the non-profit organization in 1990 as one of the original agency representatives. The MRC (formerly the Broadcast Ratings Council) is a government-sanctioned group that audits and accredits research services for the media industry.[1] Its membership consists of top researchers across the industry including broadcast networks, local stations, advertisers, agencies, cable networks, media companies and industry associations. Nielsen's national and local audience

[1] See http://mediaratingcouncil.org/.

measurement services are among the many research services that undergo extensive audits conducted by independent auditors and evaluated by MRC committee members who subsequently vote on accreditation of such services. I was an active member of the MRC, having served on the TV, Print, Out-of-Home and Digital Committees as well as on the Board of Directors. I also served one term as Chair of the MRC Board.

A more detailed description of my qualifications is set forth in Appendix A.

II. Introduction and Summary

The Joint Sports Claimants asked that I review the testimony Dr. Jeffrey Gray submitted in this proceeding on behalf of the Program Suppliers.[2] Dr. Gray sought to estimate what he termed the "distant viewing levels and shares" of different categories of programming during the years 2010-13.[3] It is not entirely clear, from a review of Dr. Gray's written testimony alone, what he considers "distant viewing" to mean. However, as I understand it, Dr. Gray sought to estimate distant viewing by counting the number of Nielsen National People Meter (NPM) cable households that viewed all or any portion of each quarter-hour of programming on particular out-of-market broadcast stations.[4]

Dr. Gray has submitted two different versions of his analysis using different data sets and different methodologies. The first version — contained in Dr. Gray's amended March 9, 2017 and corrected April 3, 2017 written direct testimony (referred to herein as "First Version") — used raw NPM household counts and did not apply any Nielsen weighting to project the NPM households to the total universe. As Dr. Gray subsequently acknowledged, the First Version also omitted substantial NPM data for WGNA, the largest distantly transmitted station. In the second

[2] See Testimony of Jeffrey S. Gray, Ph.D. (Corrected April 3, 2017~~) ("Gray Testimony").~~).
[3] See ~~Gray Testimony at~~*Id.* p. 19, Table 2.
[4] See ~~Gray Testimony~~*Id.* at p. 19, Table 2. The industry typically defines viewership of a program as the number of households tuned to the average minute of said program – and most importantly is based on the projected sample as opposed to an individual NPM household.

version of his analysis — contained in Dr. Gray's corrected January 22, 2018 written direct testimony ("Second Version")[5], Dr. Gray purports to have included the previously omitted WGNA data. In addition, he applies what he says are NPM weights provided by Mr. Lindstrom.[6]

I believe that Dr. Gray's estimates of "distant viewing" are unreliable and invalid for at least two reasons. ~~First, they~~As an initial matter, both the First Version and the Second Version are based solely upon data from Nielsen's NPM service. That service, however, is designed to measure only nationwide viewing for nationally televised programs; it cannot properly be used to estimate viewing in particular markets, primarily because of sampling design and sample size limitations. ~~Second, Dr. Gray fails to account for the fact that Nielsen assigns different weights to each of the NPM households; he improperly treats each NPM household as having the same weight. Thus, he ignores an element that is critical to the accurate and fair use of Nielsen data~~This problem infects both the First Version and Second Version. Second, Dr. Gray does not use appropriate weights to project from the raw NPM household data to the total universe. In the First Version, Dr. Gray erred by using the raw count of NPM households without applying any weighting to account for how those households relate to the particular distant signal markets he analyzed. In the Second Version, Dr. Gray errs by applying Nielsen's national NPM weights, which are meant to project the NPM households to represent nationwide viewing levels and cannot reliably project the NPM households to distant viewing levels in particular markets. Such

[5] Testimony of Jeffrey S. Gray, Ph.D. (as corrected January 22, 2018). All cites to "Gray Testimony" apply to both his 2017 and 2018 Testimony, as the texts are largely similar.

[6] I also understand that Dr. Gray changed his methodology for his multiple regression analysis. Whereas in the first version of his report Dr. Gray applied a single multiple regression analysis to estimate "viewing", in the second version of his report Dr. Gray used a separate multiple regression analysis for WGNA. *See* Amended Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding, at p. 1-2 (Feb 12, 2018) (Amended Wecker Report).

national weighting is not appropriate for estimating non-national distant viewing. It is not possible to make reliable projections without using the appropriate weights.

In my opinion, one cannot reasonably consider the "viewing" estimates in Table 2 of Dr. Gray's testimony (the Initial Version or the Second Version) to reflect distant viewing by the universe of cable subscribers.

III. Nielsen Employs Different Samples and Methodologies to Measure National Viewing and Local Viewing

Nielsen offers different services to measure the audiences that watch television programming. One such service (NPM) measures national audiences that watch programming distributed nationally by national broadcast and cable networks and via syndication. Other services measure the audiences for programming televised by individual (local)broadcast stations.

A. National People Meter (NPM) Service

Nielsen's NPM service "provides estimates of in-home audiences of nationally televised programs" and is "based upon a national sample of U.S. television-equipped households."[7] Nielsen implemented the NPMs in 1987 as the method of collecting audience viewing data for all national television programming. The people meter is an electronic device that utilizes a meter attached to the TV set in combination with a remote control that has a button for each member of the sample household who is instructed to push his or her respective button when watching television. The meter automatically captures when the television set is on and the channel to which it is tuned while the remote captures the household member who is viewing. Previously Nielsen estimated national viewing using a combination of set meters which measured the on/off status of the television set as well as the channel tuned and length of that

[7] Nielsen National Reference Supplement 2012-13 at 1-1, Bates No. PS-2010-13-C-004415-004607.

tune, with "diaries" where sample households wrote down the programs they watched and when they watched them. As cable penetration expanded in the 1980s, diaries were deemed unreliable as a means of capturing viewing and thus Nielsen switched to people meters for national audience estimates. Since the latter captured viewing electronically, this change provided what Nielsen considered to be more accurate ratings estimates, especially for lower rated nationally-distributed cable networks.

During the years 2010-2013, the NPM sample consisted of approximately 22,000 households. Nielsen carefully selected the NPM sample to represent approximately 110,000,000 U.S. TV Households, approximately 60% of which subscribed to cable. In order for a sample that small to properly represent a constituency that large, special care must be given to sample selection, including (but not limited to): geographic distribution (to ensure all areas in the U.S. are represented); demographic distribution (age, gender, race, ethnicity, income, education, etc.); cable status; and presence of children. Nielsen employs sophisticated weighting schemes to lessen the chance of any bias in the NPM audience estimates. Each household is representative of a certain number of viewers. As Nielsen explains: "The weights measure the number of people in the population that are represented by each member of the sample. For example, if [a] sample member has a weight of 20,000 for a selected day, this means that on that day the sample member represents 20,000 in the population."[8] As this also suggests, the weight attached to each NPM household ~~might~~may vary on a daily basis.

Nielsen selected the NPM households to be representative of nationwide viewership of programming that is distributed nationally. These households were not selected to measure viewership in particular markets or portions of those markets; generally, there are insufficient

[8] https://audiencewatch.nielsen.com/data/help/Tutorial/Appendices/Weighted%20vs.%20Unweighted/weighted.htm

participating NPM households in a given locality to measure local viewership. While there might be a people meter or two in a specific county, one could not properly use the viewing results from those people meters alone to estimate the local viewing in that county.

B. Local Market Services

Nielsen employs different samples when measuring local rather than national viewership. Nielsen uses three different methods for measuring local markets which vary depending on market size. There are a total of 210 local markets in the U.S., known as "Designated Market Areas" (DMAs). Nielsen assigns each county in the United States to one, and only one, DMA so that the DMAs are mutually exclusive and do not overlap. It also associates each broadcast television station with a single DMA.

1. Local People Meters (Top 25 Markets)

In the top 25 DMAs, Nielsen supplements the NPM households with additional people meters, known as Local People Meters (LPM), because there simply are not enough National People Meters in any market to measure local viewing in that market. For the largest markets (1-5) in 2010-2013, Nielsen added between 800 and 1000 additional households per market, and it added 600 per market for the remaining twenty markets. For each such market, Nielsen weighted the NPM sample households differently to be representative of the local market rather than the national market.

2. Set Meters/Diaries (Markets 26-56)

In the next largest group of DMAs (26-56) Nielsen utilized a combination of set meters (to gather household viewing) and diaries (to capture demographic viewing) during 2010-2013. The set meter is attached to the television and captures set on/off and channel tuned. The meters measure household viewing 24/7 passively. However, a completely different sample of homes fill out paper diaries which are only done for one week at a time during the sweep periods of

February, May, July and November (note: the larger markets have three additional months of measurement). The diaries are merged with the household tuning data from the set meters to project audience estimates in a process called meter/diary integration. Sample sizes vary by market.

3. **Diaries (Market 57-210)**

During 2010-2013, Nielsen used diaries in all non-LPM markets (as described above) but diaries were the sole source of audience measurement in markets 57-210. A completely separate sample is utilized in each of these markets and respondents are recruited to fill out one 7 day/24-hour diary per member of the recruited home during the sweep periods.

* * * * * * * *

All of the above methods employ varying design-specific weighting schemes to ensure proper representation. The importance of these design-specific statistical adjustment procedures cannot be underestimated as these adjustments are critical to the mitigation of bias in the projections.

IV. The Distant Viewing Estimates In The Gray Testimony (Table 2) Are Unreliable And Invalid

A. Misuse of National People Meter Data

I understand that, for each of the years 2010-2013, Dr. Gray selected a stratified random sample of approximately 150 broadcast television stations of the more than 1,000 stations that cable systems retransmitted outside the their local markets, *i.e.*, on a distant signal basis.[9] Nielsen then provided Dr. Gray with a custom report that was purported to show the number of NPM cable households tuned to all or any portion of a quarter hour of programming broadcast on

[9] I understand that a broadcast station is generally considered to be a "distant signal" in geographic areas outside its local DMA; however, for purposes of these proceedings, the legal standard for determining distant signal status is not in all cases identical to the DMA.

the sample stations during 2010-2013 — broken down by the number of NPM households located within counties that the Program Suppliers considered local for each such station (local NPM households) and NPM households outside those counties (distant NPM households).[10]

~~For~~With regard to the First Version of Dr. Gray's analysis, for approximately 94 percent of the quarter hours on the ~~Gray~~ sample of stations, Nielsen's custom report provided Dr. Gray with no data whatsoever as to viewing by distant NPM households; for the remaining quarter hours, the Nielsen custom report generally showed that no more than one or two NPM cable households viewed all or a portion of those quarter hours. Less than 0.01% of the quarter-hours showed viewing by more than five NPM cable households.[11]

These results are not surprising. As explained above, Nielsen designed the NPM service on which Dr. Gray relied, to measure national viewing of nationally-distributed programming, not to estimate the number of households that viewed a broadcast station's programming in any given market, local or distant. Thus, there were an insufficient and unrepresentative number of NPM households to measure viewing in each market; and, for all markets, the participating households were weighted in the NPM sample to be representative on a national rather than local level. Dr. Gray appears to recognize as much when he states that the "many instances of no recorded distant viewing" were "[d]ue to the low frequency of distant viewing and the size of the sample Nielsen uses to measure total U.S. household viewing …."[12] What he ignores, however, is that that the NPM sample was not intended to measure viewing in each separate market.

[10] See Gray Testimony at pp. 12-13; Testimony of Paul B. Lindstrom, at pp. 4-5 ("Lindstrom Testimony") (Dec. 22, 2016); ~~Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding, at pp.11-12 (Sept. 15, 2017) (Wecker Report).~~Amended Wecker Report, at pp. 6, 12-13.

[11] See Amended Wecker Report at p.~~13~~ 15, Table 5.

[12] See Gray Testimony at p. 17.

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The one exception here involves viewing of programming on WGNA, which was included in each of Dr. Gray's 2010-2013 samples. Unlike the other sample stations, WGNA was nationally- distributed and available to over 40 million cable households around the country in 2010-2013, and the NPM service should have been able to provide valid and reliable viewing estimates for WGNA. However, as I understand it, Nielsen's custom report forused by Dr. Gray in the First Version of his analysis showed no data for the vast majority of quarter hours on WGNA and showed no more than one household as viewing each of the remaining quarter hours.[13] Indeed, according to the report, only one distant NPM household watched one minute of a single program (a Bulls telecast) during the year 2013. I would not have expected such results. And, in fact, they appear to be inconsistent with NPM viewing data that Nielsen has provided to other customers.[14]

A. Failure To Account For Nielsen Weighting

An additional problem with Dr. Gray's study is that he estimates distant viewership using unweightedI understand that the Second Version of Dr. Gray's analysis contained a much more robust dataset for WGNA than the First Version.[15] Apparently, Nielsen had not provided Dr. Gray with complete NPM data in the original data set used for the First Version of his report. However, the same issues found in the First Version regarding absent viewing data for non-WGNA stations remain in the dataset underlying the Second Version. For example, with regard to the non-WGNA stations, approximately 94 percent of the quarter hours on the sample stations, still show no data whatsoever as to viewing by distant NPM households.[16] And of the remaining 6 percent, the vast majority only have data from a single NPM household.

[13] See Amended Wecker Report at pp.13-14 15-17.
[14] See Amended Wecker Report at p. 15pp. 17-18.
[15] See Amended Wecker Report at pp. 19-22.
[16] See Amended Wecker Report at pp. 22-23.

B. Misuse of Nielsen ~~data.~~ Weights

As explained above, Nielsen carefully weights each NPM household to ~~help~~ ensure that the NPM data can properly be projected to the television universe; those weights are not all the same and weightings may change on a daily basis for individual NPM households. The weight of a sample member equals the number of members of the population that the sample member represents. Nielsen sample weights are generally between 4,000 and 30,000.

~~In~~In the First Version, Dr. Gray, in arriving at his distant viewing estimates, ~~Dr. Gray~~ treats each NPM ~~sample~~ household as equal ~~—~~-- even though each NPM sample household is not equal in Nielsen's sample design. Rather, each household is representative of a different number of potential viewers. Simply estimating the number of sample participants that might view a given program is not an accurate means of estimating viewership. By ignoring the weighting and assuming one people meter household is the same as another, Gray ~~also applies the unweighted data in a manner for which it was not intended. It should be noted that it would likewise be inappropriate to apply the NPM weights to data concerning distant viewing. As discussed above, Nielsen develops weights specific to the sample at issue. The NPM weights are only representative of national viewing. In order to estimate distant viewing, one would need to develop weights specific to the market being estimated.~~uses the unweighted data in a manner for which it was not intended.

As I noted in my original written rebuttal testimony, Dr. Gray cannot solve the weighting issue simply by applying NPM weights. That is because the NPM weights are designed to project a given household to measurement of a national audience. However, much of the distant viewing that Dr. Gray is attempting to measure is not national in scope, and thus the NPM weights do not allow one to reliably project regional viewership of a regionally distributed program from the viewing behavior of a specific NPM household. In order to project from an

NPM household to a non-national distant signal market, one would need, among other things, to utilize a market-specific weight for the household at issue. For example, in markets where Nielsen has Local People Meters, it uses weighting specific to the market for each home in the sample, even though some of the same homes are also used in the NPM sample. Nielsen does not apply the NPM weights to measure local viewing. This is not a trivial issue. Absent an appropriate weight, it is not possible to project from a specific household in the sample to the universe that one is trying to predict.

Nonetheless, in the Second Version of his viewing analysis, I understand that Dr. Gray applied the NPM weights rather than obtaining appropriate non-national weighting for the station being measured.[17] The use of the NPM weights leads to impossible results and renders Dr. Gray's efforts to predict viewing unreliable. Consider the case of KUNW. This is a low power station in Yakima, Washington; in 2013 only 454 subscribers had access to KUNW as a distant signal. Thus, by definition, if every single subscriber was watching a given program at the same time (which in my experience is extremely unlikely), there could not be more than 454 distant cable households viewing that program. Yet, by using the NPM weights which are designed to project national viewership, Dr. Gray estimated that between 12,829 and 31,463 of such households viewed a given 15-minute segment of programming on KUNW.[18] Given that there are only 454 distant subscribers, Dr. Gray's weighted inputs for KUNW are impossible and overstate viewing on KUNW by at least 30 times over and likely more.

This issue is not limited to KUNW. For example, I understand that more than 22% of the stations included by Dr. Gray in his sample contain one or more instances in which the weighted viewing for a given 15 minute record of compensable viewing exceeds the total number of

[17] See Amended Wecker Report at pp. 31-32.
[18] See Amended Wecker Report at pp. 37-38.

distant subscribers,[19] which again is simply not possible. Likewise, I understand that more than 18% of the stations included by Dr. Gray in his sample contain one or more instances in which the weighted viewing for a given 15 minute record of compensable viewing is between 50-100% of total subscribers.[20] This, too, is not possible. As a comparison, viewing of the Super Bowl, the #1 viewed program each year, is seen by only about 45% of television households. Still further, I understand that approximately 31% of the stations in Dr. Gray's sample contain at least one instance in which the weighted viewing for a given 15 minute record of compensable viewing is between 20-50%,[21] again an either impossible or highly implausible outcome given that the most highly viewed sitcoms on the broadcast networks are watched by only about 8-9% of the potential audience. In sum, Dr. Gray's misapplication of NPM weights results in unreliable predictions of viewing for non-national distantly transmitted stations.

CONCLUSION

Based on my professional experience and expertise in television audience measurement, it is my opinion that both the First Version and the Second Version of Dr. Gray's study are methodologically flawed and should not be used in its present form. Dr. Gray uses the NPM sample for a purpose for which it was not intended and not capable of measuring—namely, non-national distant signal viewing. Dr. Gray further exacerbated the unreliability of his analysis by using weights meant for the NPM sample. The NPM weights can only be used to project national viewing and cannot provide reliable projections of non-national distant viewing. In order to estimate distant viewing, one would need to utilize weights specific to the market being analyzed.

[19] See Amended Wecker Report at p. 39.
[20] See Amended Wecker Report at p. 40.
[21] See Amended Wecker Report at p. 40, Table 19.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on ~~September __, 2017~~February __, 2018.

Susan Nathan

APPENDIX A

Susan Nathan Consultancy: January 2015-present

Susan uses her expertise in research and technical media issues to provide guidance and advice to organizations in the media industry.

Turner Broadcasting: August 2007-December 2014
Senior Vice President, Affiliate Research, Media Currency & Research Systems

Susan held a leadership role at Turner and was on the Executive Committee that oversaw the 180 Turner Researchers. She ran a successful team of research professionals and her varied responsibilities included:

Complete oversight of Turner Network Sales & Marketing research efforts which provided insight on audiences and industry trends, and oversaw the development of analyses and custom research to assist top management in setting strategy and goals for marketing Turner's networks to MVPDs;

All research activities for ~~TBS, Inc.'s~~Turner's in-house media planning agency, Turner Media Group (TMG), including designing and conducting custom research on the effectiveness of off-air promotions as well as partnering with media sellers to develop key insights for the implementation of strategic media plans;

Ongoing research analysis and insights regarding advertising currencies, audience measurement initiatives and emerging industry and market trends in support of all ~~TBS, Inc.~~Turner businesses. This specifically included expertise in all issues regarding Nielsen;

Management of all research systems utilized by Turner Research including the development of custom and proprietary modules to drive increased business for ~~TBS, Inc.;~~Turner;

Oversight of Turner's Media Lab facility in Atlanta utilized for focus groups and usability studies benefiting ~~TBS, Inc.~~Turner and client businesses.

Other Professional Experience:

1991-2007	Senior Vice President, Director of Media Knowledge Universal McCann/McCann Erickson
1986-1991	Senior Vice President, Director of Media Research Laurence, Charles, Free & Lawson
1981-1986	Vice President, Director of Media Research Needham, Harper Worldwide

1978-1981	Network Negotiator
1977-1978	Senior Media Research Analyst William Esty Company
1974-1977	Account Group Manager A.C. Nielsen Company

Professional Associations

4A's Media Research Committee (member 1986-2007, former Chair)
AMRC – Agency Media Research Council (member 1981-2007, former Chair)
ARF – Advertising Research Foundation (member 1980-2014, former Subcommittee Chairperson)
CIMM – Coalition for Innovative Media Measurement (2009-2014)
MRC - Media Ratings Council (member 1990-2014, former Chair of the Board)
Nielsen Customer Expert Committee (2007-2014)
Nielsen Policy Guidelines Committee (1997-2005)

Susan has been very active in the media research community include being a long standing active member of the Media Rating Council including its Board of Directors and has served as Chair of the Board. In addition to the MRC, she served as Turner's representative on CIMM (Coalition for Innovative Media Measurement), CRE's RPD Committee, comScore's Cross Media Advisory Board, the CONCAM Technical Subcommittee, the IAB Research Council and several ARF committees.

Susan was also the former Chair of the 4A's Media Research Committee and the Agency Media Research Council from her days on the agency side of the business.

EXHIBIT E

Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

	)	
In re	)	
	)	
DISTRIBUTION OF CABLE ROYALTY FUNDS	)	**NO. 14-CRB-0010-CD (2010-13)**
	)	
	)	

Written Rebuttal Testimony of

DR. MARK A. ISRAEL

September 15, 2017
Amended February 12, 2018

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I. QUALIFICATIONS

1. I am a Senior Managing Director of Compass Lexecon, an economic consulting firm where I have worked since 2006. I received my Ph.D. in Economics from Stanford University in 2001. From August 2000 to June 2006, I served as an Associate Professor at Northwestern University's Kellogg School of Management. I have served as an expert for both the federal government and private parties in matters involving the cable television, broadcast television, wired and wireless telecommunications and broadband internet service industries (among others), including high profile recent mergers such as Comcast-NBCU, AT&T-Time Warner, AT&T-Leap Wireless, T-Mobile-Metro PCS, and numerous acquisitions for Gray Television, as well as many regulatory matters in front of the FCC and state regulatory agencies on behalf of cable system operators (CSOs), the National Association of Broadcasters, and others.

2. A more complete description of my qualifications can be found in Appendix A to my written direct testimony in this proceeding on behalf of the Joint Sports Claimants (JSC).[1]

II. INTRODUCTION AND SUMMARY

3. In my original testimony, I explained that observable marketplace behavior corroborates the results of the 2010-13 Bortz surveys.[2] In particular, my regression analysis—based on an updated and improved version of the methodology used by Professors Rosston and Waldfogel in previous cable royalty distribution proceedings[3]—

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[1] Written Direct Testimony of Dr. Mark A. Israel, *In re Distribution of Cable Royalty Funds*, December 22, 2016, (hereinafter *Israel Testimony*).

[2] "Cable Operator Valuation of Distant Signal Non-Network Programming: 2010-13" (hereinafter *Bortz Report*), attached to the Written Direct Testimony of James M. Trautman, *In re Distribution of Cable Royalty Funds*, December 22, 2016.

[3] Statement of Joel Waldfogel, *In the Matter of Distribution of the 2004 and 2005 Cable Royalty Funds Before the Copyright Royalty Judges*, Docket No. 2007-3 CRB CD 2004-2005, June 1, 2009 (hereinafter *Waldfogel Report*); Statement of Gregory Rosston, *In the Matter of Distribution of the 1998 and 1999 Cable Royalty Funds Before the Copyright Arbitration Royalty Panel*, Docket No. 2001-8 CARP CD 98-99, December 1, 2002 (hereinafter *Rosston Report*).

produces relative valuations of the Agreed Categories[4] that closely match those in the Bortz surveys. My analysis of payments made by cable networks to carry JSC and other programming during the years 2010-13 further corroborates the high relative valuations for live team sports (Sports) programming found in the Bortz surveys.

4. In this report, I respond to written testimony from other parties in the proceeding.[5] I conclude that the testimony from experts on behalf of other parties, as well as the updated analyses I have performed in response to this testimony, further corroborate the results of the 2010-13 Bortz surveys. I provide a more detailed discussion of my analysis of the testimony of the other experts in the following paragraphs.

5. First, the regression analysis presented by Dr. Gregory Crawford on behalf of Commercial TV Claimants directly supports the 2010-13 Bortz survey results. Indeed, although we conducted our analyses entirely independently of each other, we both came to comparable conclusions that corroborate the Bortz results. Notably, his estimates are similar to mine despite some differences in technical methodological choices (of the type that regularly occur across different regression analyses by different economists).

6. Second, the alternative versions of my model that Dr. Erkan Erdem produced on behalf of Devotional Claimants also support the results of the 2010-13 Bortz surveys. However, Dr. Erdem's criticisms of "Waldfogel-type" regression analysis in the context of this proceeding generally, and of my regression analysis in particular, are without merit. As the Copyright Royalty Judges (Judges) and the Copyright Arbitration Royalty

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[4] The Copyright Royalty Judges' 11/25/2015 Order, Exhibit A. The Agreed Categories are 1) Program Suppliers, 2) Commercial Television Claimants (CTV), 3) Joint Sports Claimants (Sports), 4) Public Television Claimants (PTV), 5) Devotional Claimants (Devotional), 6) Canadian Claimants (Canadian). See *Israel Testimony* ¶15 for more detail. In addition to these categories, there are the (1) Music Claimants (Music) category, which covers the music works included within broadcast programming and (2) National Public Radio (NPR) category, which covers programming on non-commercial radio stations. I understand that Music and NPR are no longer parties in this proceeding.

[5] I address those opinions for which I have a specific response based on my own analysis; any lack of explicit response to a particular opinion or analysis of Claimants' testimony does not imply that I agree with that opinion or analysis. Instead, it likely implies that my previous testimony and underlying materials are already fully responsive to such opinions and analyses.

Panel (CARP) previously found, such an analysis is useful in assessing whether the actual economic behavior of CSOs corroborates the Bortz survey results.

7. Third, I agree with Mr. John Sanders' testimony on behalf of Devotional Claimants "that a constant sum survey of cable operators such as that prepared by Bortz is the most appropriate methodology for the Allocation phase of a cable royalty proceeding."[6] However, Mr. Sanders' criticisms of regression analysis in this proceeding are unfounded.

8. Fourth, Dr. Jeffrey Gray's testimony on behalf of Program Suppliers — in which he focuses upon the volume and viewing of minutes of programming — does not provide a sound basis for determining the relative value of that programming. Dr. Gray's analysis of volume is fundamentally flawed in that it fails to consider differences in the number of cable subscribers who receive the programming in question. And his analysis of viewership fails to recognize that CSOs place far greater value per minute on some types of programming (e.g., Sports) than others, as actual marketplace behavior shows. Bottom line, neither program volume nor program viewing can be equated with program value.

9. Fifth, Dr. Steckel's criticisms of the Bortz survey, on behalf of Program Suppliers, are incorrect as a matter of economics. Despite Dr. Steckel's claim to the contrary, surveys of CSO executives provide the best measure of the relative valuation of the Agreed Categories on distant signals, particularly given that in the ordinary course of business those executives must evaluate the relative value of different categories of programming to make programming choices. Moreover, Dr. Steckel advocates the use of marketplace data to determine relative value of the Agreed Categories, which further emphasizes the importance of regression analyses like mine and Dr. Crawford's (among others) that corroborate the Bortz survey results using actual marketplace data.

10. Sixth, Mr. John Mansell's analysis of the growth in available content, submitted on behalf of Program Suppliers, actually underscores the high value placed on Sports

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[6] Amended Direct Testimony of John S. Sanders, *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter *Sanders Amended Testimony*), p. 29.

programming. In particular, it points to reasons why the value of Sports, relative to other types of programming, is *increasing*, as reflected in a comparison of the 2004-05 and 2010-13 Bortz results. Mr. Mansell overlooks that recent technological changes in the media environment have negatively and disproportionately impacted the value of other types of programming, such as Program Suppliers content, while the value of Sports programming has remained high.

11. Seventh, my regression analysis corroborates the findings of the Bortz surveys, but does not corroborate the Horowitz surveys on behalf of Program Suppliers. In particular, the Bortz surveys, the results of my regression, and Dr. Crawford's regression each show the rank order for the top program categories as Sports, Program Suppliers, CTV and PTV, in that order, while Horowitz surveys do not match this rank order. The fact that the Horowitz survey fails to correspond well to actual marketplace evidence, as captured by the regression analyses, is not surprising given the flaws in the Horowitz methodology laid out in the testimony of Mr. James Trautman and Dr. Nancy Mathiowetz.[7] And notably, the fact that my regression analysis, as well as Dr. Crawford's, correctly allocates the minutes in Mr. Horowitz's "Other Sports" category into the appropriate Agreed Categories, and yet still closely matches the Sports values found in the Bortz survey, refutes Mr. Horowitz's claim that the Bortz survey is somehow invalidated by not using a separate valuation question for "Other Sports" programming.

12. Finally, the testimony of Dr. Lisa George on behalf of Canadian Claimants is flawed. Her finding of a higher value for Canadian Programming comes not from her focus on the Canadian region, but rather from her improper, complete reliance on a model that collapses all types of programming on U.S. signals into a single catch-all category. Once one properly controls for all of the Agreed Categories, Dr. George's model

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[7] See Corrected Written Rebuttal Testimony of James M. Trautman, *In re Distribution of Cable Royalty Funds*, ~~September 15~~October 15, 2017 (hereinafter, *Trautman Corrected Rebuttal Testimony*); and Written Rebuttal Testimony of Nancy A. Mathiowetz, *In re Distribution of Cable Royalty Funds*, September 15, 2017 (hereinafter, *Mathiowetz Rebuttal Testimony*).

produces small shares for Canadian Claimants, consistent with the findings of the Bortz surveys.

III. DR. GREGORY CRAWFORD'S REGRESSION ANALYSIS ON BEHALF OF THE COMMERCIAL TELEVISION CLAIMANTS FURTHER CORROBORATES THE 2010-13 BORTZ SURVEY RESULTS

13. In his testimony, Dr. Crawford describes the results of his regression analysis, with which he estimates the relative marketplace value of the Agreed Categories.[8] His overall methodological approach is similar to mine, but he uses different data and makes some different econometric implementation decisions. Despite the technical differences between our approaches, Dr. Crawford finds relative marketplace values for the Agreed Categories that are similar to mine, and his results also corroborate the relative shares implied by the Bortz survey, demonstrating the robustness of this finding.

14. The Bortz surveys, my analysis, and Dr. Crawford's analysis each identify Sports programming as the most valuable category of compensable programming, with similar shares in each case. The Bortz surveys estimate a Sports share of 38.2 percent; I find a Sports share of 37.5 percent, and Dr. Crawford finds a Sports share of 35.1 percent. All three analyses estimate that Program Suppliers should receive the second largest share from the royalty fund, and all find similar shares for CTV. See Table 1, below, as well as Figure 1 which illustrates the same sets of results graphically.

[8] See Corrected Testimony of Gregory S. Crawford, Ph.D. (April 11, 2017) (hereinafter *Crawford Corrected Testimony*).

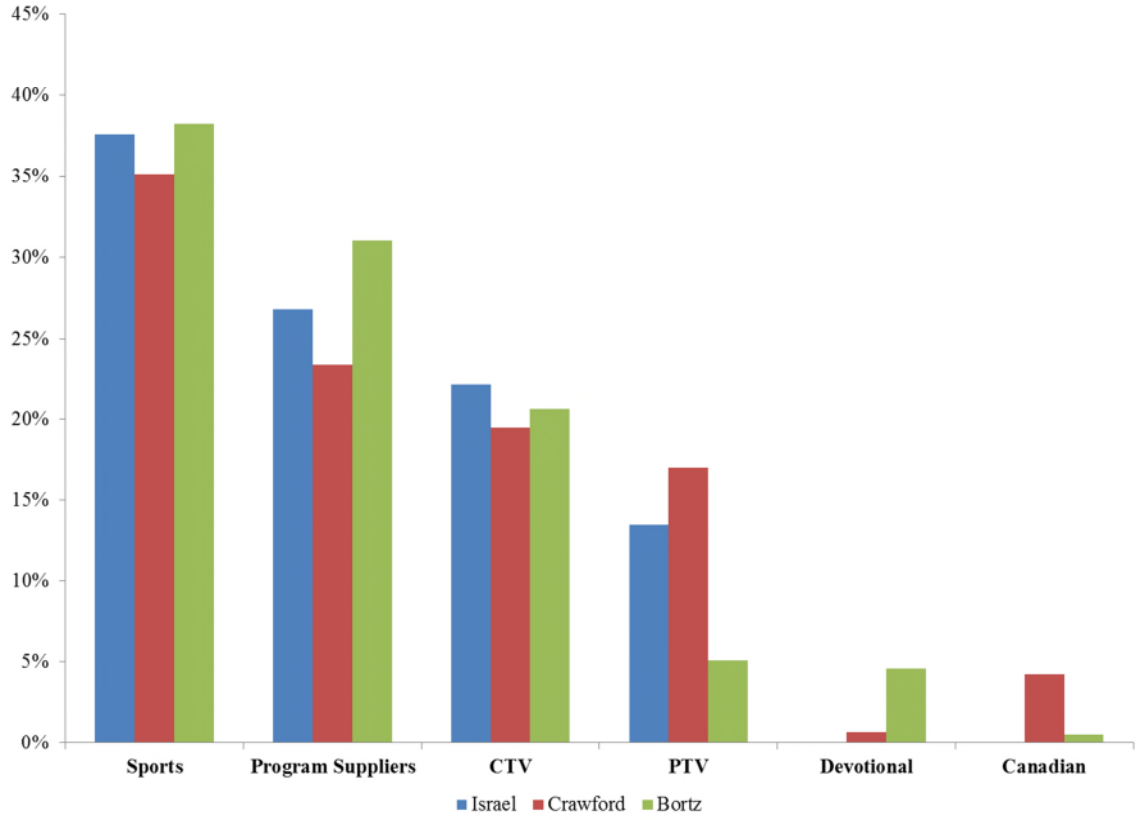
Table 1: Comparison of Israel, Crawford and Bortz Results

	Implied Share of Royalties		
Claimant Group	**Israel**	**Crawford**	**Bortz**
Sports	37.5%	35.1%	38.2%
Program Suppliers	26.8%	23.4%	31.0%
CTV	22.2%	19.5%	20.6%
PTV	13.5%	17.0%	5.1%
Devotional	0.0%	0.7%	4.6%
Canadian	0.0%	4.2%	0.5%
Total	**100.0%**	**100.0%**	**100.00%**

Source: Israel Testimony, December 22, 2016, Table V-2;
Crawford Corrected Testimony, April 11, 2017, Figure 20.
Bortz Report, December 22, 2016, Table I-1.

Notes: Israel analysis spans 2010-2012;
Crawford analysis spans 2010-2013;
Bortz analysis spans 2010-2013.

Figure 1: Comparison of Israel, Crawford and Bortz Results



15. One difference between my regression and Dr. Crawford's is that he includes a regression for the year 2013, while my analysis examined the years 2010-12. Notably,

Dr. Crawford's regression results using 2013 data also closely match the 2013 Bortz survey results, further corroborating the Bortz survey results. And Dr. Crawford's results for 2013 are also similar to my overall results for the years 2010-12, indicating that extending my analysis to include 2013 would not materially alter my findings. Dr. Crawford's 2013 regression implies a royalty share for Sports of approximately 38.6 percent, whereas the Bortz survey for 2013 finds a Sports share of approximately 37.7 percent, and my average result for 2010-12 is 37.54 percent. (See Table 2, below.) Therefore, Dr. Crawford's analysis corroborates the Bortz survey for 2013 and indicates that my focus on the period 2010-12 does not bias my results.[9]

Table 2: Comparison of Bortz 2013 Results to Crawford 2013 Results

	2013 Implied Share of Royalties	
Claimant Group	**Bortz**	**Crawford**
Sports	37.7%	38.6%
Program Suppliers	27.3%	19.7%
Commercial TV	22.7%	18.4%
Public Broadcasting	6.2%	18.1%
Devotional	5.0%	0.5%
Canadian	1.2%	4.7%
Total	**100.00%**	**100.00%**

Source: Bortz Testimony, December 22, 2016, Table I-1.
Crawford Corrected Testimony, April 11, 2017, Figure 20.

[9] In addition, Dr. Crawford gets his highest implied royalty allocation for Sports in 2013, indicating that if I had included data for 2013 in my regression analysis, it likely would have found an even greater average value for Sports programming.

IV. RESPONSES TO OTHER CLAIMANTS' WRITTEN TESTIMONY

A. DR. ERDEM'S ANALYSIS ON BEHALF OF DEVOTIONAL CLAIMANTS LARGELY CORROBORATES THE BORTZ SURVEY RESULTS, AND HIS CRITICISMS OF THE USE OF REGRESSION ANALYSES IN THIS PROCEEDING ARE WITHOUT MERIT

1. Dr. Erdem's challenges to the use of regression analysis in this proceeding are without merit

16. Although he acknowledges that "Waldfogel-type" regressions may have some value in corroborating survey evidence,[10] Dr. Erdem criticizes the use of regression analysis in this proceeding on two principal grounds. First, he claims that "regression approaches cannot inform the Judges on what the CSOs would have paid for each claimant category in a free market," because CSOs are purchasing distant signal programming in a regulated market. Second, he claims that the regression approach is not valid because it "assume[s] that the 'value' of a program category is measured in minutes of programming."[11] Both of Dr. Erdem's criticisms are unfounded.

17. **First,** Dr. Erdem is wrong that regression approaches like mine or Dr. Crawford's (or those of Drs. Waldfogel and Rosston before us) cannot inform the Judges on what CSOs would have paid for each of the Agreed Categories of programming in a hypothetical free market. As I explained in my original testimony in this proceeding, the regression allows me to determine how much more CSOs pay for each additional minute of a given type of content, holding other factors constant, which is exactly the sort of direct evidence on their willingness to pay for each type of content that one needs to corroborate the Bortz survey results using actual marketplace behavior:[12]

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10 Testimony of Erkan Erdem, Ph.D., *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter, *Erdem Testimony*), p. 18.

11 *Erdem Testimony*, p. 14.

12 See *Israel Testimony*, pp. 11-12. See also *Crawford Corrected Testimony*, p. 13 ("one can exploit the fact that distant broadcast signals are themselves bundles of programming content (and that this content varies across distant signals) to measure their relative marketplace value, even in the presence of regulated prices.")

> Although there is no marketplace price for the distant signal content, marketplace information can be gleaned from CSO carriage decisions and, in particular, what CSOs pay as a function of what they choose to carry. The regression enables me to determine the effective price the CSOs pay for each category of content by determining how much their payments go up with an additional minute of each category of content, holding other relevant factors constant.

18. Dr. Erdem is also mistaken that regression analysis cannot be informative in this context simply because the market is regulated. In past proceedings, the parties have agreed that "the sole governing standard is the relative marketplace value of the distant broadcast signal programming retransmitted by cable systems."[13] And regression analysis is a highly effective tool in this context to use the actual evidence of CSO decisions on distant signal carriage to estimate the average relative value of the Agreed Categories.

19. Indeed, in the 2004-05 cable royalty proceeding, the Judges found the Waldfogel regression helpful to corroborate the 2004-05 Bortz survey results.[14] Similarly, the Copyright Arbitration Royalty Panel found Dr. Rosston's regression analysis useful in corroborating the 1998-99 Bortz survey results.[15] Accordingly, I employed a similar regression analysis here to help the Judges assess the 2010-13 Bortz surveys results.

20. My approach is also entirely consistent with standard methods in economics. Indeed an important purpose of much empirical analysis in economics, particularly "industrial organization" economics, is to use observed behavior under one set of conditions to model what would happen under another set of conditions. For example, studies will often use empirical results in the absence of a particular regulation to predict

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[13] Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57065.

[14] Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57069.

[15] Report of the Copyright Arbitration Royalty Panel to the Librarian of Congress, October 21, 2003, p. 21. As the Librarian of Congress concluded in affirming this decision, regression analysis measures "actual behavior" and responds to past criticism of the Bortz surveys that those surveys measure only "attitudes" rather than "actual behavior." Federal Register /Vol. 69, No. 16 / Monday, January 26, 2004. Page 3615.

the effects of that regulation, or empirical results in a regulated environment to predict the effects of competition following a change in the extent of regulation.[16]

21. **Second,** Dr. Erdem is also incorrect to characterize my regression analysis as a simple time-based study (that is, a study in which valuation is determined only by minutes). I agree with Dr. Erdem that "it would be a significant simplification and mistake to assume that the 'value' of a program category is measured in minutes of programming."[17] In fact, that is why, in all of my analyses, I account for the fact that not all programming minutes are created equal, and thus do not assume value is measured in minutes, but rather account for the differential value of minutes of different types of programming. For example, I consistently find and rely on the fact that Sports minutes are more valuable than other types of programming minutes.[18]

22. Dr. Erdem does not offer a clear alternative to studying the relationship of minutes and royalties, but does offer one specific criticism: that minutes of programming could be replaced by the number of individual programs as a unit of measure, meaning that a 60 minute show or a 30 minute show would each be counted as one unit.[19] This makes no economic sense. The exercise here requires a comparison of the value of different types of programming with different lengths. A baseball game may last three hours, as long as several standard TV shows. Hence, a viewer watching a baseball game could have instead watched, say, six sitcoms in the same period of time. It would make no sense to count each of the programs as one unit, but rather makes sense to determine the value of two possibilities for three hours' worth of content.

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16 See for example Mian Dai and Xun Tang, "Regulation and Capacity Competition in Health Care: Evidence From U.S. Dialysis Markets," *The Review of Economics and Statistics*, December 2015, 97(5): 965–982; Pierre Dubois, Rachel Griffith, Martin O'Connell, "The Effects of Banning Advertising in Junk Food Markets," *Review of Economic Studies* (2017) 0, 1–41; Claudio Lucarelli, Jeffrey Prince, Kosali Simon, "The Welfare Impact of Reducing Choice in Medicare Part D: A Comparison of Two Regulation Strategies," *International Economic Review* Vol. 53, No. 4, November 2012.

17 *Erdem Testimony*, p. 14.

18 *Israel Testimony*, pp. 23-30.

19 *Erdem Testimony*, p. 14.

23. Dr. Erdem's claim that "CSOs may value a short program (e.g., 30-minutes) more than they value a longer program (e.g., 90-minutes) or that they may value a weekly program more than a daily program" does nothing to refute my point that one should compare value by minute.[20] If a 30-minute program is worth more than a 90-minute program, a CSO would surely choose (if possible given other constraints) to replace the 90-minute program with the 30-minute program. But it would also then have an additional 60 free minutes on which to air other valuable content. Only by comparing programming values by minute, as I do in my regression analysis, can one accurately compare the full value of two blocks of content that could fill a given time span.

2. Dr. Erdem's testimony supports a high relative value for Sports programming

24. Dr. Erdem performs several experiments on my regression model.[21] Although I believe that the methodology used in my regression was appropriate and Dr. Erdem's adjustments are unwarranted,[22] I also note that Dr. Erdem's alternative approaches *actually support* my finding of a high relative value on live Sports programming. In particular, Dr. Erdem's model 4B, which he notes is "very broadly comparable to the

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[20] *Erdem Testimony*, p. 14.

[21] *Erdem Testimony*, p. 14.

[22] There are at least three fundamental problems with Dr. Erdem's experiments, each of which renders them econometrically invalid. First, Dr. Erdem misunderstands the nature of the CDC data, and his calculation of "distant subscribers" double-counts subscribers, and thus results that include this measure are not informative. Second, Dr. Erdem's addition of log transformed and exponential versions of level variables that I already include in my regression model is not standard practice, and I have never seen it used before. Instead, it is an example of simply "fishing" for a specification that changes my result – throwing variables into a model until the result changes. One can nearly always find a way to change a result, but if this is done by simply adding multiple versions of the same variable to the model with no economic justification, it is not informative and cannot invalidate the result. Third, Dr. Erdem is wrong to exclude what he calls "influential observations" in my regression model. The purpose of this regression analysis is to study the relationship established by the full set of data, representing all Form 3 CSOs. Indeed even the authors Dr. Erdem cites for this statistical practice, themselves state "influential data points, of course, are not necessarily bad data points; *they may contain some of the most interesting sample information*." [Emphasis added.] See Belsley, D. E. Kuh, and R. E. Welsch, 1980. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: Wiley, p. 3.

results from both the Bortz and Horowitz surveys"[23] and which Mr. Sanders highlights in his testimony,[24] implies a 45 percent share for Sports programming. In addition, the average of Dr. Erdem's various regression models imply a 41.5 percent share of the royalty fund for Sports programming. Both of these results are similar to (indeed higher than) the average result of the 2010-13 Bortz surveys (38.2 percent), and generally in-line with my results and Dr. Crawford's results.

25. More generally, Dr. Erdem's results are broadly consistent with the valuations in the 2010-13 Bortz surveys, showing, for example, the same rank order for Sports, Program Suppliers, CTV and Public Television ("PTV"). (See Table 3.)

Table 3: Comparison of Erdem Regression Results with Bortz, Israel and Crawford

Programming Category	Bortz Survey Average 2010-2013	Israel Regression 2010-2012	Crawford Regression 2010-2013	Erdem Regression 4B 2010-2012	Erdem Regression Average 2010-2012
Sports	38.2%	37.5%	35.1%	45.0%	41.5%
Program Suppliers	31.0%	26.8%	23.4%	22.6%	22.4%
CTV	20.6%	22.2%	19.5%	21.6%	16.3%
PTV	5.1%	13.5%	17.0%	7.0%	7.1%
Devotional	4.6%	0.0%	0.7%	3.8%	2.7%
Canadian	0.5%	0.0%	4.2%	0.0%	0.0%

Source: Israel Testimony, December 22, 2016, Table V-2; Crawford Corrected Testimony, April 11, 2017, Figure 20; Bortz Report, December 22, 2016, Table I-1; Erdem Testimony, March 9, 2017, Exhibit 13

23 *Erdem Testimony*, p. 18.

24 *Sanders Amended Testimony*, p. 18.

B. MR. SANDERS' TESTIMONY ON BEHALF OF DEVOTIONAL CLAIMANTS SUPPORTS THE USE OF THE 2010-13 BORTZ SURVEYS TO DETERMINE ROYALTY SHARES, AND HIS CRITICISMS OF THE REGRESSION ANALYSES IN THIS PROCEEDING ARE WITHOUT MERIT

1. Mr. Sanders correctly concludes that the 2010-13 Bortz survey results should be the basis for determining each program category's royalty share

26. I agree with Mr. Sanders that the 2010-13 Bortz surveys should be the basis for the Judges' allocation of royalty shares among the Agreed Categories of programming.[25] As noted above, my empirical analysis of marketplace outcomes supports the results of the Bortz surveys for royalty allocation. As such, I support the results of the 2010-13 Bortz surveys for the royalty allocation to all parties, including Devotional Claimants.

27. However, I also note that the Judges' prior adjustment of the Devotional Claimants' share was based in part on a conclusion that the 2004-05 Bortz survey results likely represented a ceiling on the Devotional share due to "the amount and significance of non-compensable devotional programming contained on WGN-A during the period."[26] The 2010-13 Bortz surveys included improvements that mitigate (but do not eliminate) the impact of WGNA non-compensability,[27] and hence, using the same logic, the 2010-13 Bortz survey results should be regarded as a ceiling on the Devotional allocation of the 2010-13 royalties. Additionally, the results of my regression and Dr. Crawford's, like those of Dr. Waldfogel in the 2004-05 proceeding, "point[] toward a lower share" for the Devotional category than the Bortz surveys imply.[28]

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25 *Sanders Amended Testimony*, p. 9. ("I believe the Bortz Survey, as structured in the 2004-2005 case and as updated for this 2010-2013 proceeding, identifies the appropriate buyers of retransmission services and presents this category of buyers' views of the relative marketplace value of specific categories of programs.")

26 Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57074.

27 *Bortz Report*, pp. 5-7, 18-19, 27-30, 47-49.

28 Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57069.

2. Mr. Sanders' criticisms of regression analyses in this proceeding are incorrect

28. Mr. Sanders is incorrect in asserting that regression analysis is an inappropriate methodology for this proceeding. In general, his arguments echo Dr. Erdem's criticisms and are incorrect for the same reasons discussed above.

29. Mr. Sanders also takes issue with the use of "independent variables such as numbers of subscribers, number of channels, population served, and the like, which bear a relationship to programming decisions that is tangential at best…. They may yield a result that, while statistically compelling in an illusory manner, is meaningless for the purpose of an allocation phase royalty distribution."[29] Mr. Sander's argument makes no sense as a matter of econometrics. Such variables are also referred to as "control variables" and are a standard component of a regression analysis, used to ensure that my results isolate the effects of additional minutes of programming on CSO payments without instead capturing spurious correlation with other factors that are not controlled for. By using such control variables, my regression analysis is able to tease out the amount that "CSO royalty payments increase with each additional minute of each category of programming content, *holding other relevant factors that determine royalty payments fixed*[.]"[30]

30. I also note that the control variables that I use in my regression are essentially those used by Drs. Waldfogel and Rosston in previous proceedings, and are similar to those used by Dr. Crawford. The reason we have all used such control variables is that they clearly relate to the amount of royalties that CSOs pay for distant signals, and thereby serve as important controls to isolate the main relationship of interest: the relative marketplace value of a minute of the Agreed Categories of programming.[31]

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29 *Sanders Amended Testimony*, pp. 19-20.

30 See *Israel Testimony*, paragraph 34. (Emphasis added)

31 For example, CSO royalties are, in part, a function of the number of CSO subscribers. CSOs pay royalties to the fund based on their gross receipts from the subscribers to whom they transmit distant signals. Therefore, my regression must include a control variable that measures the number of subscribers for each CSO. Other independent

C. DR. GRAY'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS RELIES ON FUNDAMENTALLY FLAWED MEASURES OF PROGRAMMING VOLUME AND VIEWERSHIP THAT PROVIDE NO VALID ECONOMIC BASIS FOR DETERMINING RELATIVE MARKETPLACE VALUE

31. Dr. Gray's testimony focuses on "two measures of relative economic value of programming: programming volume and programming viewership."[32] For the purposes of his testimony, programming volume is the "total volume of minutes of programming retransmitted by CSOs" and viewership is the "[a]udience size, which is determined through program viewership."[33] Although he presents and discusses results on programming volume, Dr. Gray ultimately concludes that programming volume is an "imperfect" and "insufficient" measure of relative marketplace value.[34] But as to his viewership measure, he concludes that ". . . relative program viewership provides a reasonable and reliable measure of the relative economic value of distantly retransmitted programing."[35]

32. Dr. Gray's conclusions are without any economic merit. Neither of Dr. Gray's metrics – volume or viewing – provides a sound measure of the relative economic value of the Agreed Categories.

- His measures of programming volume are meaningless, as they do not account for the number of CSOs that transmit each network, let alone the number of CSO subscribers receiving programming, and thus do not show the extent to which

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variables, such as the number of local broadcast channels a CSO carries, help me to control for demand factors that might affect a CSO's willingness to pay for additional programming – if a CSO already has an abundance of non-distant broadcast signals, it will less willing to pay for distant signals, all else equal. This relationship is confirmed in my analysis. See *Israel Testimony*, Table V-1, p. 18, showing a negative relationship between the number of local broadcast channels carried by a CSO and the distant signal royalties paid by that CSO, holding all other factors constant.

32 Corrected Amended Testimony of Jeffrey S. Gray, Ph.D., *In re Distribution of Cable Royalty Funds*, January 22, 2018, (hereinafter, *Gray Corrected Amended Testimony*), p. 9.

33 *Gray Corrected Amended Testimony*, p. 9-10.

34 *Gray Corrected Amended Testimony*, pp. 10, 11.

35 *Gray Corrected Amended Testimony*, p. 22.

CSOs are retransmitting (purchasing) that programming. In any event, as Dr. Gray appears to acknowledge, relative volume does not equate with relative value.

- His reliance on programming viewership as a measure of relative economic value ignores the fact that not all programming minutes are equal: Viewers value minutes of different content differently, as I (and others) have shown for the Agreed Categories in this case. As such, viewership minutes do not determine the value of programming aired on distant signals. Rather, valid estimates of royalty shares in this proceeding must account for variation in the value per minute across categories. The Bortz surveys provide a reliable measure of these valuations, as my and Dr. Crawford's regression analyses confirm.

1. Dr. Gray's analysis of programming volume is incorrect and does not reflect relative marketplace value

33. Dr. Gray calculates what he calls "relative volume of programming by claimant category," which he admits is an "imperfect" measure of relative marketplace valuations.[36] According to Dr. Gray, the "total volume of minutes of programming *retransmitted* by CSOs effectively represents the volume of programming purchased by the CSOs . . . ."[37] He purports to calculate that volume by measuring the number of distant signal programs and minutes of those programs based on his sample of television stations retransmitted during 2010-13. In Table 1 of his testimony, Dr. Gray reports shares of "All Volume" for each of the Agreed Categories, which show a Sports share of less than 1 percent for each year from 2010 -13 and a Program Suppliers share of approximately 50 percent.[38]

34. Beyond his own admission that volume is an imperfect measure of valuation, Dr. Gray's Table 1 is flawed and misleading, because it does not account for the number of

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36 See *Gray Corrected Amended Testimony*, pp. 11, 16-18.

37 See *Gray Corrected Amended Testimony*, p. 9 (emphasis added).

38 See *Gray Corrected Amended Testimony*, pp. 17.

CSOs that receive each distant signal, let alone the number of subscribers to whom the programming is retransmitted. Thus, it does not measure the "total volume of minutes retransmitted" by CSOs, as Dr. Gray claims. Instead, Dr. Gray measures the volume of minutes televised by distant signals without regard to the number of CSOs that retransmitted those minutes or to the number of distant subscribers to whom CSOs retransmitted those minutes. Dr. Gray's analysis weights the minutes by a sampling weight, which is unrelated to the number of CSOs that retransmit the signal.[39]

35. Hence, Dr. Gray's volume analysis is unrelated to how many (or few) CSOs retransmitted that programming or how many (or few) CSOs' subscribers received it. As a result, a 120 minute movie broadcast on a single station retransmitted to 500 distant subscribers could be given equal weight to a 120 minute NBA telecast on WGNA, which hundreds of CSOs retransmitted to over 40 million distant subscribers.[40] Therefore, Dr. Gray's measure of volume does not properly account for the fact that distant signals are retransmitted by various CSOs to subscribers.[41]

36. Dr. Crawford has presented an analysis that demonstrates the large impact of Dr. Gray's errors. In particular, Dr. Crawford's Figure 12 accounts for both the number of CSOs that transmit a distant signal and the number of subscribers receiving it, yielding a

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[39] Dr. Gray's sampling weights simply adjust for the sampling procedure he has implemented and have nothing to do with the number of CSOs who retransmit the signal or the number of subscribers who receive it. For example, his sampling weight has a correlation of -0.07 with the number of distant subscribers who receive the signal (or the number of CSOs that retransmit the signal), implying that the two phenomenon are statistically unrelated. Indeed, a version of Dr. Gray's Table 1 that is unweighted looks very similar to Dr. Gray's own results in Table 1. See my Technical Appendix for details.

[40] This flaw is highly consequential and not simply theoretical. As I noted in my original testimony, some distant signals are carried by many more cable systems than others. For example, during the period 2010-12, WGN was carried in 4,127 system-periods, whereas WIAT is carried in only 10 system-periods. See *Israel Testimony*, p. Appendix B-5.

[41] See Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. by William E. Wecker, Ph.D. and R. Garrison Harvey, *In re Distribution of Cable Royalty Funds*, September 15, 2017, amended February 12, 2018 (hereinafter, *Wecker Testimony*), pp. 4-10.

subscriber-weighted share of compensable minutes for Sports of roughly 5.9 percent, as compared to Dr. Gray's figure of a less than 1 percent Sports share. See Table 4, below.

Table 4: Comparison of Gray and Crawford Measures of Volume

	2010-2013	2010-2013
Claimant Group	**Gray**	**Crawford**
Sports	0.7%	5.9%
Program Suppliers	48.3%	33.3%
CTV	14.4%	15.6%
PTV	27.8%	36.3%
Devotional	7.8%	2.3%
Canadian	1.1%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Gray Corrected Amended Testimony, January 22, 2018, Table 1.

37. I also note that the Sports share of program minutes actually received by subscribers (volume) appears to be going *up* over time, indicating that if volume of minutes has any probative value for shares of the royalty fund, the Sports share is going up over time. A calculation similar to Dr. Crawford's was performed for the 2004-05 proceeding by Dr. Richard Ducey on behalf of CTV claimants.[42] In Table 5, below, I compare the subscriber weighted shares of compensable minutes calculated in 2004-05 by Dr. Ducey to those calculated in 2010-13 by Dr. Crawford. I note that Sports share has increased slightly from 4.5 percent to 5.9 percent. However, Program Suppliers' share has decreased from 50.1 percent to 33.3 percent.

[42] Testimony of Richard V. Ducey., *In re Distribution of Cable Royalty Funds*, June 1, 2009, (hereinafter, *Ducey Testimony*), Exhibit 8.

Table 5: Share of Compensable Minutes by Claimant Group Weighted by Subscribers

	2004-2005	2010-2013
Claimant Group	**Ducey**	**Crawford**
Sports	4.5%	5.9%
Program Suppliers	50.1%	33.3%
CTV	15.5%	15.6%
PTV	22.3%	36.3%
Devotional	2.7%	2.3%
Canadian	4.5%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Ducey Testimony, June 1, 2009, Exhibit 8.

38. My analysis of cable network program expenditures also shows that measures of volume do not translate directly into value. Below I reproduce Table V-5 from my December 22, 2016 testimony (see Table 6).[43] This analysis shows that despite the relatively small share of JSC programming hours transmitted (1.06 percent) by the top 25 cable networks during 2010-13, that programming nevertheless commanded more than 22 percent of the top 25 cable networks' 2010-13 programming budgets. Said another way, JSC programming is worth almost 30 times more per programming hour than non-JSC programming for the top 25 cable networks in 2010-13.

[43] See *Israel Testimony*, pp. 25-26.

Table 6: Cable Content Analysis 2010-13, Summary of Top 25 Networks

Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
	[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
JSC	9,274.0	15,164,368.9	$12,524.7	$1,350,513.0	$0.826
Non-JSC	866,726.0	496,492,970.2	$42,702.0	$49,268.2	$0.086
JSC / Non-JSC	0.01	0.03	0.29	27.41	9.60
JSC % of Total	1.06%	2.96%	22.68%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

39. Individual cable networks with a mix of JSC and other programming show a similar pattern. Below, I reproduce table V-6 from my December 22, 2016 testimony (see Table 7), an analysis of content expenditures for TBS and TNT. This analysis shows that JSC's relatively small share of Total Programming Hours on TBS (1.95%) and TNT (2.79%) translates into a 44.40 percent and 45.46 percent share, respectively, of the amount that the cable networks spent on programming. In other words, an hour of JSC programming commands more than 40 times the value of an hour of non-JSC programming on TBS, and nearly 30 times the value of non-JSC programming on TNT.

Table 7: Cable Content Analysis 2010-13, TBS & TNT

Network	Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
		[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
TBS	JSC	684.0	1,220,722.6	$1,031.0	$1,507,370.6	$0.845
	Non-JSC	34,356.0	20,880,757.4	$1,291.2	$37,581.7	$0.062
	JSC / Non-JSC	0.02	0.06	0.80	40.11	13.66
	JSC % of Total	1.95%	5.52%	44.40%		
TNT	JSC	977.0	2,513,281.9	$2,042.0	$2,090,056.2	$0.812
	Non-JSC	34,063.0	29,162,878.1	$2,450.2	$71,931.9	$0.084
	JSC / Non-JSC	0.03	0.09	0.83	29.06	9.67
	JSC % of Total	2.79%	7.93%	45.46%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

40. In sum, simply correcting Dr. Gray's error of failing to account for how many CSOs retransmitted programming (and how many subscribers they have), significantly changes his results. Importantly, however, even with this change, one could not rely on the volume of minutes received by subscribers to determine relative valuations of the Agreed Categories without accounting for the differences in the value of each minute, a topic I discuss in greater depth in the next section in the context of viewership minutes.

2. Dr. Gray's analysis of program viewership provides no valid method for determining relative marketplace value

41. Dr. Gray also calculates the total amount of what he terms "viewing" of the Agreed Categories of programming on distant signals. In his Table 2, Dr. Gray calculates that live Sports programming constitutes roughly 5.3 to 9.2 percent of 2010-13 distant viewing.[44]

42. Dr. Gray's calculation of minutes viewed provides no reliable basis for determining the relative valuation of the Agreed Categories, most fundamentally because

[44] See *Gray Corrected Amended Testimony*, pp. 19-20.

it treats all viewing minutes as the same and thus does not account for the fact that minutes of different types of programming have different values. Dr. Gray's assumption that minutes viewed can be treated equally in determining value is flawed for many reasons, most notably that it fails to consider the number of minutes of each type of content that is available. If the same number of minutes of all types of content were available, then the total amount of each that viewers choose to consume could indicate their relative value. But given the smaller number of available minutes of Sports programming, one cannot support such a conclusion. Many viewers may wish there were more Sports programming available, and choose to watch other programming *only as a second choice* because Sports programming is not available at certain times. In that context, a smaller number of minutes of Sports programming may be worth far more to viewers than a much greater number of other types of programming, which they value less but watch as a poor substitute when live Sports is not on.[45]

43. A further problem with Dr. Gray's analysis of viewing minutes is that it ignores that it is CSOs (not viewers) that pay for programming, using such programming to fill out their channel lineups. Hence, the appropriate base for analysis of value is the number of minutes aired by CSOs (accounting for the proportion of its subscribers that receive the programming) such as I use in my regression analysis.

44. My regression methodology accounts for these issues by determining the difference in valuation across minutes of different types of programming and multiplying this by minutes aired by CSOs to determine relative values. Most notably, as described in my previous written testimony, my regressions show that a minute of Sports programming is more valuable than a minute of Program Suppliers programming. Below I reproduce Table V-2 from my testimony of December 22, 2016 (see Table 8).[46] It

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[45] As an analogy, consider that potatoes are much less expensive and more widely available than are blueberries. In 2013, U.S. consumers consumed over 33 pounds per person of fresh potatoes, compared with roughly one and a half pounds of fresh blueberries per person. But the price of blueberries ($4.73) was roughly 8x greater than potatoes ($0.56), per pound. Therefore, one cannot conclude that higher consumption equals higher value.

[46] See *Israel Testimony*, p. 20.

shows that an additional minute of Program Suppliers programming is much less valuable ($0.469) than an additional minute of Sports programming ($4.836). Hence, the fact that CSOs carry many more prorated distant signal minutes of Program Suppliers programming (51,261,616) than they do of Sports programming (6,962,722) cannot be used to infer that they place more value on Program Supplier programming than they do on Sports programming; an adjustment for the value of each type of content per minute is required, such as I provide in my analysis.

Table 8: Previous Israel Table V-2, Royalty Share Allocation

Claimant Group	Value of an Additional Minute[1]	System and Prorated DSE Weighted Compensable Minutes	Value of Minutes	Implied Share of Royalties
[A]	[B]	[C]	[D] = [B] * [C]	[E] = [D] /(89,701,903)
Sports	4.836**	6,962,722	33,674,484	37.54%
Program Suppliers	0.469***	51,261,616	24,058,506	26.82%
Commercial TV	1.01***	19,677,607	19,873,956	22.16%
Public Broadcasting	0.66**	18,322,702	12,094,957	13.48%
Devotional	-0.701***	4,384,240	0	0.00%
Canadian	-0.973***	4,839,825	0	0.00%
Total		**105,448,713**	**89,701,903**	**100.00%**

Source: TMS/Gracenote; Cable Data Corporation; Kantar Media/SRDS

Notes: *, **, and *** indicate results are significant at the 90, 95, and 99 percent confidence levels, respectively.

[1] Minutes prorated.

45. Returning to my analysis of cable network expenditures, it shows that measures of viewership also do not translate directly into value. Below I reproduce Table V-5 from my December 22, 2016 testimony (see Table 9).[47] This analysis shows that despite JSC's relatively small share of household viewing hours (HHVH, 2.96 percent) for the top 25 cable networks, JSC programming nevertheless commands more than 20 percent of the top 25 cable networks' programming budgets. Said another way, JSC programming is worth roughly 10 times more per household viewing hour than non-JSC programming for the top 25 cable networks.

[47] See *Israel Testimony*, pp. 25-26.

Table 9: Cable Content Analysis 2010-13, Summary of Top 25 Networks

Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
	[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
JSC	9,274.0	15,164,368.9	$12,524.7	$1,350,513.0	$0.826
Non-JSC	866,726.0	496,492,970.2	$42,702.0	$49,268.2	$0.086
JSC / Non-JSC	0.01	0.03	0.29	27.41	9.60
JSC % of Total	1.06%	2.96%	22.68%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

46. Focusing again on the individual cable channels, TBS and TNT, which show a mix of JSC and non-JSC programming, exhibit the same relationship between household viewing hours and value (See Table 10, below). Specifically, although JSC programming represents only 5.52 percent of HHVH on TBS and 7.93 percent of HHVH on TNT, that programming represents 44.40 percent and 45.46 percent of program expenditures, respectively. This means that the value of an hour of JSC viewing is worth roughly 13 times more than a viewing hour of non-JSC programming on TBS, and nearly 10 times more than a viewing hour of non-JSC programming on TNT.

Table 10: Cable Content Analysis 2010-13, TBS & TNT

Network	Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
		[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
TBS	JSC	684.0	1,220,722.6	$1,031.0	$1,507,370.6	$0.845
	Non-JSC	34,356.0	20,880,757.4	$1,291.2	$37,581.7	$0.062
	JSC / Non-JSC	0.02	0.06	0.80	40.11	13.66
	JSC % of Total	1.95%	5.52%	44.40%		
TNT	JSC	977.0	2,513,281.9	$2,042.0	$2,090,056.2	$0.812
	Non-JSC	34,063.0	29,162,878.1	$2,450.2	$71,931.9	$0.084
	JSC / Non-JSC	0.03	0.09	0.83	29.06	9.67
	JSC % of Total	2.79%	7.93%	45.46%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

47. In sum, Dr. Gray is wrong to focus solely on volume and viewership to estimate relative marketplace value for the Agreed Categories. His measure of volume is simply incorrect and neither measure accounts for the obvious fact that not all minutes are equally valuable. Proper measures must account for the variation in value across minutes of different types, either by directly asking CSOs to report on the value of the programming (as the Bortz survey does), by using a regression analysis to determine value per minute which can then be multiplied by total minutes (as my first method does),[48] or by relying on the values paid for Sports and non-Sports programming on cable channels (as my second method does).

D. DR. STECKEL'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS IS NOT VALID ECONOMIC ANALYSIS

48. Dr. Steckel claims that CSO surveys, like those performed by Bortz on behalf of Sports programming and Mr. Horowitz on behalf of Program Suppliers, are not appropriate sources of information for the Judges to use in determining the relative

[48] As does the regression analysis by Dr. Crawford for Commercial TV Claimants.

marketplace value of the Agreed Categories.[49] He offers several reasons for this opinion and, based on those reasons, he advocates for the use of market data or surveys of customers instead of CSO surveys.[50]

49. Dr. Steckel is simply incorrect as a matter of economics. The most relevant source of information on the value of a product is the views of the buyers. Hence, in this case, the most relevant source of information on the value of distant signal programming is the views of CSO executives, who are the buyers of the programming and who make such programming decisions as part of their job. Therefore, the Bortz survey of CSOs should be the primary source of information for the Judges.[51] This is especially true given that regression analyses using available marketplace data on distant signals corroborate the findings of the Bortz surveys, as do market data on cable network expenditures.

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[49] Dr. Steckel's opinion in this proceeding is contradicted by much in the previous record, including the Judges themselves, various expert testimony (including my own), and the United States Court of Appeals for the District of Columbia Circuit. See for example: The Judges (Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57065. "Having carefully reviewed and considered all of the evidence in the record, the Judges find that the values of the program categories at issue among these contending claimants are most reasonably delineated by a range bounded by certain results indicated primarily by the Bortz constant sum survey"); expert testimony (e.g., Written Direct Testimony of Dr. Robert Crandall, 2004-05 Phase I (JSC Written Direct Statement Ex. No. 4), 1998-99 Phase I (JSC Written Direct Statement Ex. No. 6), 1989 Phase I (JSC Written Direct Statement Ex. No. 7); Written Direct Testimony of Michelle Connolly, Ph.D., *In re Distribution of Cable Royalty Funds*, December 22, 2016 (hereinafter, *Connolly Testimony*) (supporting Bortz survey and citing prior testimony of experts for CTV, PTV, Canadian and Devotional claimants supporting Bortz survey); and the D.C. Circuit (Program Suppliers v. Librarian of Congress, 409 F.3d 395, 402 (D.C. Cir. 2005), ("Nor did the CARP act unreasonably in declining to rely on Nielsen for direct evidence of viewing, as Bortz adequately measured the key criterion of relative market value. Moreover, as the CARP put it, Bortz 'subsumes inter alia all viewing data that a CSO might consider when assessing relative value of programming groups.").

[50] Direct Testimony of Joel Steckel, Ph.D., *In re Distribution of Cable Royalty Funds*, December 22, 2016 (hereinafter, *Steckel Testimony*), pp. 7-8.

[51] For ease of reference, when referring to CSO surveys for the purposes of responding to Dr. Steckel, I will refer to the Bortz surveys. See Section IV.F, below, which explains why my analysis supports the Bortz survey as superior to the Horowitz surveys.

1. In the relevant hypothetical market, the CSO is the buyer and thus the relevant focus of the survey

50. Dr. Steckel points to the Bortz surveys' reliance on CSO respondents to provide relative valuations for the Agreed Categories as a weakness of the survey. He believes that instead of the opinions of cable executives, one should focus on the opinions of subscribers. However, in both real world and the hypothetical free market for distant signals, the CSO is the buyer of the content. Hence, Dr. Steckel is wrong as a matter of economics: the relevant opinion on value is the opinion of the buyer, which is what the Bortz Survey captures.

51. In fact, the nature of distant signals is such that the value placed on the content by the CSO is the sole determinant of price for distant signals in a hypothetical free market. In general, as a matter of economics, the price for a product is determined by the marginal benefit to buyers and the marginal cost to sellers. In this case, however, the marginal cost to produce distant signals is zero in all cases, as the signals are simply retransmitted signals that have already been produced. Thus, the only variation in a hypothetical free market for distant signals would come from variation in the marginal benefit that CSOs would derive from retransmitting different distant signals. Therefore CSOs' valuation on distant signals is the relevant determinant of price in a hypothetical free market.

52. Dr. Steckel's claim that subscriber surveys would be superior to CSO surveys is misguided. Arguing that one should survey cable subscribers instead of cable operators is to argue that one should not ask the actual buyers what they will pay, but rather the people whose valuations the operators are aggregating. This makes no economic sense. An analogy might be that instead of asking the parents how much they would pay for a vacation, you should survey all the family members (i.e. children) whose views the parents are aggregating in arriving at a willingness to pay for various vacation options. This method could not be as accurate as surveying parents directly, as the survey analyst would then have to decide how to aggregate the views of the various family members into an overall value, when what really matters is how the *parent*, who pays for the trip, would aggregate those values. Similarly, surveying subscribers would leave the analyst

to aggregate those values to make inferences about CSO valuation, when the relevant question is how the CSOs perform such aggregation, which can be answered by asking them directly.[52]

53. In fact, Dr. Steckel ultimately agrees with this. He says "[i]f you want to know if customers will buy a product, ask them. If you want to know why customers are not buying a product, ask them. If you want to know what customers (*i.e.*, the market) value, ask them."[53] I agree with Dr. Steckel's reasoning, but the customers *are* the CSOs.

54. Dr. Steckel also argues that "[i]f managers really understood what their customers value, every product would be a success. In fact, we know over half of new industrial products fail."[54] This argument is entirely beside the point. The purpose of the Bortz survey is not to ask CSOs, as *suppliers*, about the value of new product, rather it is to ask CSOs as *buyers* what they would have spent, on a relative basis, for the Agreed Categories of programming, the relevant question in determining the valuation of those program categories. Dr. Steckel's argument would apply if Bortz were asking the network executives at the distant signal (e.g. WGN executives) how much they think their content is worth. In that case, Dr. Steckel would be correct that those executives may not know how much various content is worth to buyers. In contrast, the CSOs are the buyers of the distant signals. Therefore the CSOs should be the respondents to the survey valuing distant signal programming.

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52 See also *Connolly Testimony*, pp. 18-19. On the point of CSOs as buyers, Dr. Connolly states: "Moreover, given that the respondents of the Bortz survey are internalizing their beliefs about subscriber preferences when responding to questions about the relative value of categories of programming, this aspect of the market is reflected in the Bortz survey." In addition, Dr. Connolly quotes Dr. Steven Wildman, who correctly concludes that "[b]ecause CSOs are the purchasers in the relevant marketplace and subscriber demands are filtered through them, the CSO survey results must be considered more primary and as more directly relevant to the determination of appropriate compensation than the subscriber surveys."

53 See *Steckel Testimony*, pp. 40-41.

54 See *Steckel Testimony*, p. 41.

2. CSO executives are experts in valuing content

55. Dr. Steckel believes that cable executives would be unable to respond accurately to the Bortz surveys, because they would give biased answers based on "intuition- and heuristics-based decision-making processes."[55] In particular, he says that cable executives cannot be expected to value programming, because they "do not make decisions about individual programs or the various categories of programming employed in this proceeding. They make decisions about television stations and cable networks."[56] This argument is incorrect.

56. The idea that cable executives do not think about underlying types of programming, but only think about networks as a whole, flies in the face of the realities of the cable television industry. In my own work, I interact with both cable executives and content providers regularly. Their discussions about what certain networks are worth – both how cable executives value them and how networks market themselves – are all about breaking down the value of the underlying content. One particularly salient example: as cable executives decide what TBS and TNT are worth, they are directly evaluating the individual value of the sports content, the original content, and the reruns. When they consider what HBO is worth, they consider "Game of Thrones", other new content, and movies. In fact, cable executives change their entire promotional strategy when "Game of Thrones" premieres on HBO, indicating that they are focused on the underlying shows, not the network generically. When they decide what to pay for an RSN, they value the Sports programming separately from the filler programming. Cable executives do have the expertise and experience to look across their networks and separately value content along the lines of the Agreed Categories; in fact, this is central to their day to day jobs.[57]

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55 See *Steckel Testimony*, pp. 21-22, 28-34.

56 See *Steckel Testimony*, p. 23.

57 See Written Rebuttal Testimony of Allan Singer, September 15, 2017, p. 11; Written Rebuttal Testimony of Daniel M. Hartman, September 15, 2017, p. 1-3, 16-18.

3. Dr. Steckel's discussion of marginal vs. total values is incorrect

57. Dr. Steckel argues that the Bortz survey captures only the "marginal return" (that is, the value created by one more minute of programming) of each category, whereas the marketplace value is captured by the "total return."[58] This is simply incorrect.[59]

58. In fact, the Bortz survey asks respondents to focus on the non-network programming on the distant signals they carry, and then asks for the relative value of *each type of programming*, not the marginal value of one more minute of the programming.[60] And then it clarifies that respondents should consider how they would divide up a fixed budget for "all the programming" broadcast on those distant signals. So this question is not asking how much extra they would spend for one additional minute or hour of the programming; it is asking how much they would spend for "all" of each category of programming. Hence this is exactly the right question: it is "marginal" only in the sense that it takes *other, network and cable* programming as given, but it then asks for the total value of the full bucket of minutes of each type of programming broadcast by the distant signals. In this way, it captures the total value of each category of distant signals – not just the value of the last minute – while correctly recognizing that these distant signals are being added to a lineup of other programming.

59. Marketplace behavior for other types of programming (e.g. cable networks) confirms that the Bortz survey asks the right question. For example, in my experience working with multiple CSOs, when they negotiate for a given cable network (or bundle of networks) – from Disney for example – they determine the price they are willing to pay by starting from a base of the other networks they carry and then asking how much additional profit they can make by adding the Disney networks, as a whole. And in doing

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58 See *Steckel Testimony*, p. 26 ("any presumed equivalence between resource allocations and marketplace value rests on total return, not marginal return.")

59 Previous testimony on this topic directly contradicts Dr. Steckel. See Testimony of Robert W. Crandall, Ph.D., (JSC Written Direct Statement Ex. 7), pp. 9-14. ("It is this latter measure of value – the total value as represented by the area under the demand curves – that is captured by the Bortz survey.")

60 See *Bortz Report*, pp. B-5 & B-6, questions 4a and 4b.

so, they consider the value of the various categories of programming (sports on ESPN, animation, etc.) that come with the Disney networks, again as a whole. This process, carried out by each CSO, determines the overall marketplace value of the content across all CSOs. And it's exactly the process that the Bortz survey mimics, by asking how much CSOs would allocate to each category of distant signal programming, in total.

4. CSO management of multiple systems does not invalidate the Bortz Survey results

60. Dr. Steckel also argues that the fact that many survey respondents manage multiple cable systems would introduce ambiguity and bias into the survey results.[61] However, this concern is without basis. First, it ignores that the Bortz survey asks very system specific questions about the precise distant signals carried on each system during the relevant period, so confusion should not be an issue.[62] And, even where an executive was the respondent for more than one system, in the Bortz survey a separate questionnaire was administered for each system.[63] Second, cable executives are generally responsible for a *large and changing* number of systems and thus must determine the value of content on the various systems as part of their day to day job. Hence, Dr. Steckel is once again asserting that cable executives are not qualified to answer questions at the heart of their responsibilities, an unreasonable assertion for which he provides no support.

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61 See *Steckel Testimony*, pp 25-26.

62 See for example, *Bortz Report*, p. B-3, question 2a. "Industry data indicate that your system serving (ENTER COMMUNITY LISTED ABOVE; i.e., primary community from SOA) and nearby communities carried the following broadcast stations from other cities in 2010", after which the survey administrator reads off individual distant signal channels by call letters.

63 *Trautman Corrected Rebuttal Testimony*, p. 43 n.29. In contrast, in the Horowitz survey when an executive was the respondent for more than one system, "he/she was only asked to respond to one survey for all the systems with the same channels." Corrected Testimony of Howard Horowitz, *In re Distribution of Cable Royalty Funds*, April 25, 2017 (hereinafter, *Horowitz Corrected Testimony*), p. 8.

5. Analysis of marketplace data corroborates the Bortz surveys

61. Finally, even if one were to accept any of Dr. Steckel's criticisms, and thus question the accuracy of survey results, the appropriate next step would be to make sure those results are corroborated by actual marketplace evidence. Indeed, Dr. Steckel appears to agree with this approach: He states his preference for the analysis of "market results" and data on "transactions," as opposed to surveys.[64] In this case, actual market result and data on transactions *corroborate* the Bortz survey results. In particular, as explained above, my regression results (as well as Dr. Crawford's) and my analysis of cable network expenditures corroborate the Bortz surveys' findings. Therefore, even if one takes Dr. Steckel's recommendation and relies on actual marketplace data, the Bortz survey results are simply bolstered.

E. MR. MANSELL'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS MISINTERPRETS THE IMPLICATIONS OF THE RAPIDLY GROWING SOURCES OF CONTENT

62. Mr. Mansell concludes "that over the past 30 years, the number of live professional and college team sports games on local over-the-air TV stations has significantly declined."[65] In support of this opinion, Mr. Mansell offers a limited history of Sports broadcasting, describing the expansion of Sports programming to cable, the internet and mobile devices.

63. Mr. Mansell's analysis is flawed in at least two fundamental ways. **First**, in his brief summary of this history of Sports programming, Mr. Mansell skips over the most relevant point: Even as the sources of supply of Sports content have expanded, its value (overall and per minute) has remained high. Indeed, Mr. Mansell's own testimony shows the continued value and desirability of Sports programming, as he refers to bidding wars for the Sports programming that has migrated from broadcast networks to RSNs and

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64 See *Steckel Testimony*, p. 39.

65 Corrected Testimony of John Mansell, *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter, *Mansell Corrected Testimony*), p. 4.

national broadcasts,[66] and he affirmatively demonstrates that Sports programming is valuable.[67]

64. Because it ignores the ongoing high value of sports content, Mr. Mansell's analysis is ultimately irrelevant. The statistical and survey methodologies used by myself, Dr. Crawford, and Bortz compute the value of the various categories of programming *given whatever changes have occurred in the marketplace*. For example, my analysis uses data on actual minutes of distant signal content during the relevant period, as well as data on royalties paid by CSOs during the same period, to estimate how CSOs valued the broadcasts according to their Agreed Categories. More generally, to the extent there have been changes in the availability of sports content (or Program Suppler content) from various sources, the data during the relevant time period speak for themselves on the effect of the changes. Put simply, the results of the Bortz surveys, my analysis, and Dr. Crawford's analysis answer the question of value, *reflecting the effect of all industry trends*, whether those discussed by Mr. Mansell or others.[68]

65. Moreover, available data show that Mr. Mansell's conclusion is wrong as a matter of fact, as it pertains to distant signal retransmissions during 2010-13. While Mr. Mansell may be correct that there has been a gradual migration of Sports programming to cable channels and other outlets over the past thirty years, for the comparatively shorter time period between 2004-05 and 2010-13, the relative amount of compensable Sports programming retransmitted on distant signals actually increased. Below I reproduce as Table 11 an analysis that I performed above, comparing compensable minutes by

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66 See *Mansell Corrected Testimony*, p. 10.

67 See *Mansell Corrected Testimony*, p. 36.

68 The Judges reached the same conclusion in the 2004-05 proceeding. See Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57070 n.18. ("Various arguments are made by some parties concerning whether or not the Judges must consider or require proof of changed circumstances, separate and apart from the estimates of relative value presented by the parties. We find, as did the 1998–99 CARP, that changed circumstances are embedded within the methodologies that provide reliable estimates of relative valuations and, therefore, have already been accounted for and are subsumed within the calculus of results. See 1998–99 CARP Report at 16, 31–2.")

claimant group in 2004-05 as compared with 2010-13.[69] As this table shows, the percentage of Sports minutes increased slightly from 4.5 percent in 2004-05 to 5.9 percent in 2010-13. Therefore, at least as it affects distant signal retransmission in the recent past, Mr. Mansell's implication that the quantity of Sports programming has declined is incorrect.

Table 11: Share of Compensable Minutes by Claimant Group Weighted by Subscribers

	2004-2005	2010-2013
Claimant Group	**Ducey**	**Crawford**
Sports	4.5%	5.9%
Program Suppliers	50.1%	33.3%
CTV	15.5%	15.6%
PTV	22.3%	36.3%
Devotional	2.7%	2.3%
Canadian	4.5%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Ducey Testimony, June 1, 2009, Exhibit 8.

66. **Second**, Mr. Mansell's analysis overlooks the broader implications of the rapidly evolving media environment, which have had a disproportionately negative impact on the value of other categories of programming, and in particular Program Suppliers, while the value of Sports programming has been remained high. Contrary to Mr. Mansell's conclusions, the industry recognizes that the category of programming that has primarily lost value due to the explosion of content is not live Sports but rather Program Supplier content.[70] This has occurred because the relevant period saw the explosion of Subscription Video On-Demand (SVOD) services like Netflix, Hulu and Amazon, and a general explosion in available content similar to that offered by Program Suppliers.

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69 See Table 5, above.

70 http://variety.com/2016/tv/news/peak-tv-2016-scripted-tv-programs-1201944237/ . During 2010-13, the number of basic cable original scripted shows more than doubled. These statistics only account for the number of new shows, and does not account for the explosion of previously viewed content throughout cable, cable on-demand, and SVOD services.

Indeed, by the end of 2013, Netflix had more than 30 million U.S. subscribers,[71] and by the third quarter of 2013, Netflix was streaming about 5 billion hours of video globally, virtually all of it Program Suppliers programming.[72] The explosion of content has thus particularly affected Program Supplier content.[73] Indeed, accepted wisdom today is that the traditional, linear TV model (on which distant signals air) is more dependent on Sports than ever.[74]

F. MY REGRESSION ANALYSIS DOES NOT CORROBORATE THE FINDINGS OF THE HOROWITZ SURVEYS PERFORMED ON BEHALF OF PROGRAM SUPPLIERS

67. The 2010-13 Horowitz surveys (Horowitz surveys) were developed by Howard Horowitz with the intention of replicating the "methods and procedures of the Bortz Survey that was done for the 2005 royalty year" but with certain modifications.[75] As one example, particularly relevant to my regression analysis, Mr. Horowitz adds a new category to his survey method: "Other sports," meant to specify non-team sports programming such as horse racing and figure skating, which is not attributable to Joint Sports Claimants, but rather is attributable to Program Suppliers.[76]

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71 https://www.nytimes.com/2014/01/23/business/media/growth-of-netflix-subscribers-surpasses-analysts-expectations.html

72 http://variety.com/2014/digital/news/netflix-to-focus-on-adding-higher-rated-and-exclusive-titles-cfo-says-1201187028/

73 http://articles.latimes.com/print/2012/sep/30/entertainment/la-et-st-homeland-market-20121001. Viewership for individual scripted shows had decreased drastically by the relevant time period.

74 http://variety.com/2013/tv/news/sports-fans-to-spend-more-money-to-watch-favorite-teams-1200577215/ . "The price of TV broadcast rights for sports in the age of time-shifted viewing has soared. After all, it's high-demand content that viewers don't DVR. And unlike other video entertainment, it's not available from Netflix or other Internet services." See also http://www.reuters.com/article/us-facelxlok-mlb-idUSKBN1602MY and https://www.digitaltrends.com/social-media/facebook-and-twitter-are-trying-to-acquire-rights-to-stream-live-tv-content/ , which show that providers like Facebook and Twitter are competing to broadcast Sports games, but are not generally interested in "conventional TV programs."

75 *Horowitz Corrected Testimony*, p. 3.

76 See *Horowitz Corrected Testimony*, p. 5.

68. My regression results, as well as those of Dr. Crawford corroborate the Bortz survey results and fail to corroborate the Horowitz survey results. Hence, actual marketplace evidence supports use of the Bortz survey, not the Horowitz survey, and rejects Mr. Horowitz's claim that not including a separate "Other Sports" category invalidates the Bortz results.

69. Table 11, below, presents a comparison of the results of the Horowitz and Bortz surveys with the results of my regression analysis and Dr. Crawford's regression analysis. As the Table shows, while the Bortz survey matches the regression results well, the Horowitz surveys fail to match the regression results, particularly for the most important, high value categories.[77] The Bortz surveys, my regression analysis and the Crawford regression analysis all imply the same rank order for the top 4 categories: Sports, Program Suppliers, CTV and PTV, in that order. The Horowitz surveys, in contrast, rank these categories as: Program Suppliers, Sports, PTV and CTV, thus failing to match the regression results.

70. It is also notable that the Bortz surveys, my regression analysis, and the Crawford regression analysis all value Sports within roughly 3 percentage points of each other, while the Horowitz valuation (30.0 percent) is 5 percentage points below the lowest, and 8 percentage points below the highest valuation from the other studies. For Program Suppliers, the Horowitz surveys (39.0 percent) are 8 percentage points above the highest of the three analyses, and 12 percentage points above the lowest, whereas Bortz, Israel and Crawford are within roughly 4 percentage points of each other.

[77] For ease of comparison, I present a royalty-weighted average of the Horowitz survey results. Indeed on a year-by-year basis, some of the Horowitz survey results are even more extreme than this average. See *Horowitz Corrected Testimony*, p. 16, Table 3.2.

Table 12: Comparison of Bortz, Israel, Crawford and Horowitz Results

	Implied Share of Royalties			
Claimant Group	**Israel**	**Crawford**	**Bortz**	**Horowitz average**
Sports	37.5%	35.1%	38.2%	30.0%
Program Suppliers	26.8%	23.4%	31.0%	39.0%
CTV	22.2%	19.5%	20.6%	12.6%
PTV	13.5%	17.0%	5.1%	13.2%
Devotional	0.0%	0.7%	4.6%	4.7%
Canadian	0.0%	4.2%	0.5%	0.6%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Israel Testimony, December 22, 2016, Table V-2;
Crawford Corrected Testimony, April 11, 2017, Figure 20.
Bortz Testimony, December 22, 2016, Table I-1.
Horowitz Testimony, December 22, 2016, Table 3.2

Notes: Israel analysis spans 2010-2012;
Crawford analysis spans 2010-2013;
Bortz analysis spans 2010-2013.
Horowitz analysis spans 2010-2013.

71. The failure of the Horowitz survey to match actual marketplace evidence, as reflected in the regression results, is not surprising given the flaws in the Horowitz survey laid out by Mr. Trautman and Dr. Mathiowetz in their testimony.[78] In particular, the anomalously high value accorded to Program Suppliers in the Horowitz surveys supports Mr. Trautman's conclusion that the Horowitz surveys tend to bias respondents to overvalue Program Suppliers programming.

72. Finally, I note the fact that my regression analysis, as well as Dr. Crawford's, correctly allocates the minutes in Mr. Horowitz's "Other Sports" category into the appropriate Agreed Categories (including attributing any program that would be included in Mr. Horowitz's "Other Sports" category to Program Suppliers), and yet still closely matches the values found in the Bortz survey, refutes Mr. Horowitz's claim that the Bortz

[78] See *Trautman Corrected Rebuttal Testimony*, pp. 12-28; *Mathiowetz Rebuttal Testimony*, pp. 15-27.

survey is somehow invalidated by not accounting for the Other Sports minutes correctly.[79]

G. DR. GEORGE'S TESTIMONY ON BEHALF OF CANADIAN CLAIMANTS IS FLAWED, AND A CORRECTED ANALYSIS SHOWS LOWER VALUATIONS FOR CANADIAN PROGRAMMING

73. Dr. George performs a regression analysis that "shares many features of the regression model presented by Dr. Joel Waldfogel in the 2004-05 proceeding," but which she says is "modified to focus more precisely on the value of Canadian Claimant programming."[80] She concludes that the value of an additional minute of Canadian programming is worth roughly $0.089 within the "Canadian region" of cable operators, and estimates that Canadian Claimants should receive approximately 7.11 percent of the royalty fund.[81]

74. Importantly, in reaching her conclusions, Dr. George simultaneously makes two main modifications to the Waldfogel methodology, without indicating which drives her results:

- First, for her regression analysis, she limits her sample to those cable systems which reside in what she calls the "Canadian region."[82] Using this sample, she estimates an implied share of the royalty fund for Canadian Claimants for those

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79 See *Horowitz Corrected Testimony*, p. 5.

80 Written Direct Statement of Lisa M. George, *In re Distribution of Cable Royalty Funds*, December 15, 2016 (hereinafter, *George Testimony*), p. 1. Dr. George amended her testimony on March 8, 2017 (hereinafter, *George Amended Testimony*), and then issued corrections to both the *George Testimony* and the *George Amended Testimony* on May 17, 2017 (hereinafter, *George Corrected Amended Testimony and George Corrected Testimony*).

81 *George Corrected Amended Testimony*, Amended Table 3, p. 6. Dr. George expresses the value of an additional minute of Canadian programming in thousands, at $88.88 per 1,000 minutes.

82 Dr. George defines the Canadian region to include both systems that are in the "Canadian Zone" (i.e., the geographic area within which CSOs are permitted to retransmit Canadian signals under the statutory license) and systems "absorbed into the zone through merger." *George Corrected Amended Testimony*, p. 1.

cable systems, and then prorates that share to account for cable systems outside the Canadian region.[83]

- Second, for her programming data, she only separately categorizes programming that appears on Canadian distant signals and lumps all other programming into a single category called "Compensable Minutes on US Distant Signals".[84]

75. Dr. George focuses her discussion on her choice to limit her sample to only those cable systems that are able to carry Canadian signals, but this is not actually what drives her results. Instead what drives those results for Canadian Claimants is her decision to lump the vast majority of programming into a single "Compensable Minutes on US Distant Signals" category. If one instead properly accounts for the specific programming category into which each minute falls, then even when only considering cable systems in the Canadian region, one finds a royalty share for Canadian Programming that is in line with the results of the Bortz surveys. Hence, Dr. George's higher Canadian share is driven by *only* separately counting minutes on Canadian signals (which is the only source of Canadian minutes), while using a much noisier measure of minutes in other categories. That is, her results are driven by many important variables on the number of minutes by each other category, thus subjecting her regression to omitted variable bias, not by limiting analysis to the "Canadian region."[85]

76. In addition to correcting Dr. George's regression analysis, I have also corrected her calculation for estimating the share of royalties to conform more closely to Dr.

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83 *George Corrected Testimony*, p. 22.

84 *George Corrected Testimony*, p. 21.

85 In Appendix C to my testimony, I estimated a model with only two variables concerning the Agreed Categories: 1) Sports programming and 2) Non-Sports programming. As I said in my testimony, by focusing on the result of Sports programming, this "model sensitivity is intended to test whether the value for Sports minutes is sensitive to splitting out the individual programming categories." My key conclusion was that my finding of high Sports value *was not* affected by this alternative categorization, meaning that it was robust to such change in categories. Hence this finding was the opposite of Dr. George's result, which holds *only if* the programming categories are collapsed and does not hold in a more complete model.

Waldfogel's original method, listed in this table as "Corrected Canadian Royalty Share". Dr. George includes negative coefficient values, such as her estimate for Program Suppliers programming on Canadian signals, in her calculation, rather than setting them to zero, which distorts the royalty shares for categories with positive coefficients. I also remove the weighting scheme that Dr. George used in her calculation, which weighted results by the number of subscribers at each CSO. The Waldfogel-type regression method estimates the royalties per CSO, not the royalties per subscriber, as a function of the CSO's distant signal programming and various control variables. Weighting the total CSO minutes by subscriber is therefore not an appropriate use of the output of this regression, because the functional form of the regression assumes that royalties are measured per CSO, not per subscriber. As a result of these changes to Dr. George's royalty share calculation, even using Dr. George's own regression results yields only a 3.95 percent share of the total royalty pool for Canadian programming.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 12, 2018.

Mark A. Israel

TECHNICAL APPENDIX

V. TECHNICAL APPENDIX: THE DETAILS OF DR. GEORGE'S REGRESSION ANALYSIS

1. Table 13, below, compares:

   1) Dr. George's original base regression results

   2) Dr. George's regression, breaking out all Agreed Categories (by using the measure of minutes from the data used in my regression).[86]

[86] As I only have programming data categorized for 2010-12, this sample excludes the year 2013. Full regression results and implied royalty share calculations for all Agreed Categories are provided in my underlying documents.

Table 13: Regression Models Concerning the Canadian Region

	(1)	(2)
	George Base Model (2010-2013)	**George Model with Individual Programming Categories (2010-2012)**
Corrected Canadian Royalty Share	3.95%	1.48%
Dr. George's Calculation of Canadian Royalty Share	7.11%	2.25%
Minutes of Canadian Programming		0.371**
		(0.148)
Minutes of Commercial TV Programming		1.100***
		(0.384)
Minutes of Devotional Programming		0.141
		(0.338)
Minutes of Program Suppliers Programming		0.0227
		(0.150)
Minutes of Public Broadcasting Programming		1.553***
		(0.291)
Minutes of Sports Programming		7.633**
		(3.527)
Minutes of Other Programming		1.634***
		(0.586)
Minutes of Network Programming		1.132***
		(0.429)
Distant Canadian Signals - Wtd. Canadian Minutes (1,000)	88.88***	
	(32.92)	
Distant Canadian Signals - Wtd. Sports Minutes (1,000)	906.8	
	(774.1)	
Distant Canadian Signals - Wtd. Program Supplier Minutes (1,000)	-293.8**	
	(121.0)	
Distant Domestic Signals - Wtd. Total Minutes (1,000)	44.09***	
	(5.294)	
Observations	2,198	1,657
R-squared	0.861	0.854

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. As column (2) of Table 13 shows, estimating Dr. George's model with controls for all programming categories (thus avoiding omitted variable bias)—but still limiting analysis only to CSOs from the Canadian region—yields an estimate for Canadian programming of roughly 1.48 percent of the total royalty fund. This result is much

smaller than Dr. George's own finding of 7.11 percent for Canadian programming's royalty share, and much closer to the Bortz surveys' estimate of 0.5 percent.

3. As seen in the second column of Table 13, the values on many other categories of programming are quite different from my base model when restricted to the Canadian region. This is, however, in no way a refutation of my base results, which correctly reflect the full set of CSOs. Finding different results when restricting only to a small, non-randomly selected set of CSOs is not surprising, but is also irrelevant to the question of the appropriate values, reflecting the full set of CSOs.

VI. TECHNICAL APPENDIX: DR. GRAY'S TABLE 1

4. Table 14, below, compares the results of Dr. Gray's Table 1 to the results of his analysis but without the use of his sampling weights. The results for JSC programming in particular are very similar between the two versions.

Table 14: Comparison of Weighted and Unweighted Gray Table 1 Results

	Share of All Retransmissions							
	Original Gray Table 1				Unweighted Gray Table 1			
	2010	2011	2012	2013	2010	2011	2012	2013
Canadian Claimants	0.5%	1.4%	1.5%	0.8%	3.4%	4.0%	6.3%	5.7%
Commercial Television	11.7%	10.2%	14.6%	14.4%	11.5%	11.0%	12.2%	10.7%
Devotionals	7.8%	12.1%	5.4%	6.9%	5.2%	4.7%	2.3%	2.8%
Program Suppliers	55.5%	54.0%	38.3%	50.7%	45.5%	43.7%	34.2%	37.3%
Public Television	24.5%	22.1%	40.1%	26.9%	34.2%	36.4%	44.9%	43.3%
JSC	0.2%	0.2%	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%

	Share of All Volume							
	Original Gray Table 1				Unweighted Gray Table 1			
	2010	2011	2012	2013	2010	2011	2012	2013
Canadian Claimants	0.5%	1.8%	1.3%	0.8%	3.1%	3.9%	5.7%	5.3%
Commercial Television	12.8%	11.8%	18.5%	14.2%	12.8%	12.5%	14.6%	11.2%
Devotionals	8.1%	11.5%	5.3%	6.4%	5.2%	4.5%	2.3%	3.0%
Program Suppliers	53.5%	52.1%	35.8%	52.1%	43.6%	41.2%	31.5%	36.1%
Public Television	24.4%	22.1%	38.6%	25.8%	34.6%	37.2%	45.3%	43.7%
JSC	0.7%	0.7%	0.5%	0.8%	0.7%	0.7%	0.5%	0.7%

Source: Gray 2nd Corrected and Amended Table 1 and Backup Materials, January 22, 2018.

EXHIBIT F

Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

	)	
In re	)	
	)	
DISTRIBUTION OF CABLE ROYALTY FUNDS	)	**NO. 14-CRB-0010-CD (2010-13)**
	)	
	)	

Written Rebuttal Testimony of

DR. MARK A. ISRAEL

September 15, 2017
Amended February 12, 2018

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I. QUALIFICATIONS

1. I am a Senior Managing Director of Compass Lexecon, an economic consulting firm where I have worked since 2006. I received my Ph.D. in Economics from Stanford University in 2001. From August 2000 to June 2006, I served as an Associate Professor at Northwestern University's Kellogg School of Management. I have served as an expert for both the federal government and private parties in matters involving the cable television, broadcast television, wired and wireless telecommunications and broadband internet service industries (among others), including high profile recent mergers such as Comcast-NBCU, AT&T-Time Warner, AT&T-Leap Wireless, T-Mobile-Metro PCS, and numerous acquisitions for Gray Television, as well as many regulatory matters in front of the FCC and state regulatory agencies on behalf of cable system operators (CSOs), the National Association of Broadcasters, and others.

2. A more complete description of my qualifications can be found in Appendix A to my written direct testimony in this proceeding on behalf of the Joint Sports Claimants (JSC).[1]

II. INTRODUCTION AND SUMMARY

3. In my original testimony, I explained that observable marketplace behavior corroborates the results of the 2010-13 Bortz surveys.[2] In particular, my regression analysis—based on an updated and improved version of the methodology used by Professors Rosston and Waldfogel in previous cable royalty distribution proceedings[3]—produces relative valuations of the Agreed Categories[4] that closely match

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[1] Written Direct Testimony of Dr. Mark A. Israel, *In re Distribution of Cable Royalty Funds*, December 22, 2016, (hereinafter *Israel Testimony*).

[2] "Cable Operator Valuation of Distant Signal Non-Network Programming: 2010-13" (hereinafter *Bortz Report*), attached to the Written Direct Testimony of James M. Trautman, *In re Distribution of Cable Royalty Funds*, December 22, 2016.

[3] Statement of Joel Waldfogel, *In the Matter of Distribution of the 2004 and 2005 Cable Royalty Funds Before the Copyright Royalty Judges*, Docket No. 2007-3 CRB CD 2004-2005, June 1, 2009 (hereinafter *Waldfogel Report*); Statement of Gregory Rosston, *In the Matter of Distribution of the 1998 and 1999 Cable Royalty Funds Before the Copyright*

those in the Bortz surveys. My analysis of payments made by cable networks to carry JSC and other programming during the years 2010-13 further corroborates the high relative valuations for live team sports (Sports) programming found in the Bortz surveys.

4. In this report, I respond to written testimony from other parties in the proceeding.[5] I conclude that the testimony from experts on behalf of other parties, as well as the updated analyses I have performed in response to this testimony, further corroborate the results of the 2010-13 Bortz surveys. I provide a more detailed discussion of my analysis of the testimony of the other experts in the following paragraphs.

5. First, the regression analysis presented by Dr. Gregory Crawford on behalf of Commercial TV Claimants directly supports the 2010-13 Bortz survey results. Indeed, although we conducted our analyses entirely independently of each other, we both came to comparable conclusions that corroborate the Bortz results. Notably, his estimates are similar to mine despite some differences in technical methodological choices (of the type that regularly occur across different regression analyses by different economists).

6. Second, the alternative versions of my model that Dr. Erkan Erdem produced on behalf of Devotional Claimants also support the results of the 2010-13 Bortz surveys. However, Dr. Erdem's criticisms of "Waldfogel-type" regression analysis in the context of this proceeding generally, and of my regression analysis in particular, are without merit.

Arbitration Royalty Panel, Docket No. 2001-8 CARP CD 98-99, December 1, 2002 (hereinafter *Rosston Report*).

[4] The Copyright Royalty Judges' 11/25/2015 Order, Exhibit A. The Agreed Categories are 1) Program Suppliers, 2) Commercial Television Claimants (CTV), 3) Joint Sports Claimants (Sports), 4) Public Television Claimants (PTV), 5) Devotional Claimants (Devotional), 6) Canadian Claimants (Canadian). See *Israel Testimony* ¶15 for more detail. In addition to these categories, there are the (1) Music Claimants (Music) category, which covers the music works included within broadcast programming and (2) National Public Radio (NPR) category, which covers programming on non-commercial radio stations. I understand that Music and NPR are no longer parties in this proceeding.

[5] I address those opinions for which I have a specific response based on my own analysis; any lack of explicit response to a particular opinion or analysis of Claimants' testimony does not imply that I agree with that opinion or analysis. Instead, it likely implies that my previous testimony and underlying materials are already fully responsive to such opinions and analyses.

As the Copyright Royalty Judges (Judges) and the Copyright Arbitration Royalty Panel (CARP) previously found, such an analysis is useful in assessing whether the actual economic behavior of CSOs corroborates the Bortz survey results.

7. Third, I agree with Mr. John Sanders' testimony on behalf of Devotional Claimants "that a constant sum survey of cable operators such as that prepared by Bortz is the most appropriate methodology for the Allocation phase of a cable royalty proceeding."[6] However, Mr. Sanders' criticisms of regression analysis in this proceeding are unfounded.

8. Fourth, Dr. Jeffrey Gray's testimony on behalf of Program Suppliers — in which he focuses upon the volume and viewing of minutes of programming — does not provide a sound basis for determining the relative value of that programming. Dr. Gray's analysis of volume is fundamentally flawed in that it fails to consider differences in the number of cable subscribers who receive the programming in question. And his analysis of viewership fails to recognize that CSOs place far greater value per minute on some types of programming (e.g., Sports) than others, as actual marketplace behavior shows. Bottom line, neither program volume nor program viewing can be equated with program value.

9. Fifth, Dr. Steckel's criticisms of the Bortz survey, on behalf of Program Suppliers, are incorrect as a matter of economics. Despite Dr. Steckel's claim to the contrary, surveys of CSO executives provide the best measure of the relative valuation of the Agreed Categories on distant signals, particularly given that in the ordinary course of business those executives must evaluate the relative value of different categories of programming to make programming choices. Moreover, Dr. Steckel advocates the use of marketplace data to determine relative value of the Agreed Categories, which further emphasizes the importance of regression analyses like mine and Dr. Crawford's (among others) that corroborate the Bortz survey results using actual marketplace data.

10. Sixth, Mr. John Mansell's analysis of the growth in available content, submitted on behalf of Program Suppliers, actually underscores the high value placed on Sports

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[6] Amended Direct Testimony of John S. Sanders, *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter *Sanders Amended Testimony*), p. 29.

programming. In particular, it points to reasons why the value of Sports, relative to other types of programming, is *increasing*, as reflected in a comparison of the 2004-05 and 2010-13 Bortz results. Mr. Mansell overlooks that recent technological changes in the media environment have negatively and disproportionately impacted the value of other types of programming, such as Program Suppliers content, while the value of Sports programming has remained high.

11. Seventh, my regression analysis corroborates the findings of the Bortz surveys, but does not corroborate the Horowitz surveys on behalf of Program Suppliers. In particular, the Bortz surveys, the results of my regression, and Dr. Crawford's regression each show the rank order for the top program categories as Sports, Program Suppliers, CTV and PTV, in that order, while Horowitz surveys do not match this rank order. The fact that the Horowitz survey fails to correspond well to actual marketplace evidence, as captured by the regression analyses, is not surprising given the flaws in the Horowitz methodology laid out in the testimony of Mr. James Trautman and Dr. Nancy Mathiowetz.[7] And notably, the fact that my regression analysis, as well as Dr. Crawford's, correctly allocates the minutes in Mr. Horowitz's "Other Sports" category into the appropriate Agreed Categories, and yet still closely matches the Sports values found in the Bortz survey, refutes Mr. Horowitz's claim that the Bortz survey is somehow invalidated by not using a separate valuation question for "Other Sports" programming.

12. Finally, the testimony of Dr. Lisa George on behalf of Canadian Claimants is flawed. Her finding of a higher value for Canadian Programming comes not from her focus on the Canadian region, but rather from her improper, complete reliance on a model that collapses all types of programming on U.S. signals into a single catch-all category.

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[7] See Corrected Written Rebuttal Testimony of James M. Trautman, *In re Distribution of Cable Royalty Funds*, ~~September~~October 15, 2017 (hereinafter, *Trautman Corrected Rebuttal Testimony*); and Written Rebuttal Testimony of Nancy A. Mathiowetz, *In re Distribution of Cable Royalty Funds*, September 15, 2017 (hereinafter, *Mathiowetz Rebuttal Testimony*).

Once one properly controls for all of the Agreed Categories, Dr. George's model produces small shares for Canadian Claimants, consistent with the findings of the Bortz surveys.

III. DR. GREGORY CRAWFORD'S REGRESSION ANALYSIS ON BEHALF OF THE COMMERCIAL TELEVISION CLAIMANTS FURTHER CORROBORATES THE 2010-13 BORTZ SURVEY RESULTS

13. In his testimony, Dr. Crawford describes the results of his regression analysis, with which he estimates the relative marketplace value of the Agreed Categories.[8] His overall methodological approach is similar to mine, but he uses different data and makes some different econometric implementation decisions. Despite the technical differences between our approaches, Dr. Crawford finds relative marketplace values for the Agreed Categories that are similar to mine, and his results also corroborate the relative shares implied by the Bortz survey, demonstrating the robustness of this finding.

14. The Bortz surveys, my analysis, and Dr. Crawford's analysis each identify Sports programming as the most valuable category of compensable programming, with similar shares in each case. The Bortz surveys estimate a Sports share of 38.2 percent; I find a Sports share of 37.5 percent, and Dr. Crawford finds a Sports share of 35.1 percent. All three analyses estimate that Program Suppliers should receive the second largest share from the royalty fund, and all find similar shares for CTV. See Table 1, below, as well as Figure 1 which illustrates the same sets of results graphically.

[8] See Corrected Testimony of Gregory S. Crawford, Ph.D. (April 11, 2017) (hereinafter *Crawford Corrected Testimony*).

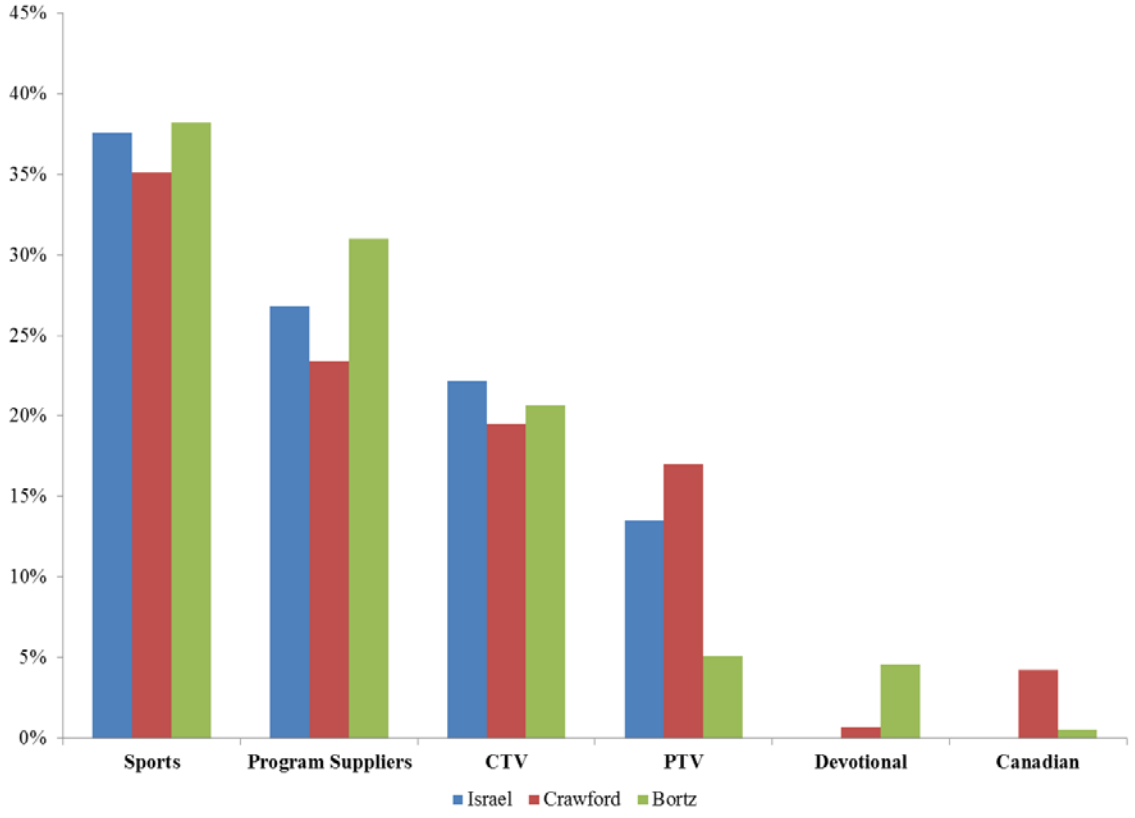
Table 1: Comparison of Israel, Crawford and Bortz Results

	Implied Share of Royalties		
Claimant Group	**Israel**	**Crawford**	**Bortz**
Sports	37.5%	35.1%	38.2%
Program Suppliers	26.8%	23.4%	31.0%
CTV	22.2%	19.5%	20.6%
PTV	13.5%	17.0%	5.1%
Devotional	0.0%	0.7%	4.6%
Canadian	0.0%	4.2%	0.5%
Total	**100.0%**	**100.0%**	**100.00%**

Source: Israel Testimony, December 22, 2016, Table V-2;
Crawford Corrected Testimony, April 11, 2017, Figure 20.
Bortz Report, December 22, 2016, Table I-1.

Notes: Israel analysis spans 2010-2012;
Crawford analysis spans 2010-2013;
Bortz analysis spans 2010-2013.

Figure 1: Comparison of Israel, Crawford and Bortz Results



15. One difference between my regression and Dr. Crawford's is that he includes a regression for the year 2013, while my analysis examined the years 2010-12. Notably, Dr.

Crawford's regression results using 2013 data also closely match the 2013 Bortz survey results, further corroborating the Bortz survey results. And Dr. Crawford's results for 2013 are also similar to my overall results for the years 2010-12, indicating that extending my analysis to include 2013 would not materially alter my findings. Dr. Crawford's 2013 regression implies a royalty share for Sports of approximately 38.6 percent, whereas the Bortz survey for 2013 finds a Sports share of approximately 37.7 percent, and my average result for 2010-12 is 37.54 percent. (See Table 2, below.) Therefore, Dr. Crawford's analysis corroborates the Bortz survey for 2013 and indicates that my focus on the period 2010-12 does not bias my results.[9]

Table 2: Comparison of Bortz 2013 Results to Crawford 2013 Results

	2013 Implied Share of Royalties	
Claimant Group	**Bortz**	**Crawford**
Sports	37.7%	38.6%
Program Suppliers	27.3%	19.7%
Commercial TV	22.7%	18.4%
Public Broadcasting	6.2%	18.1%
Devotional	5.0%	0.5%
Canadian	1.2%	4.7%
Total	**100.00%**	**100.00%**

Source: Bortz Testimony, December 22, 2016, Table I-1.
Crawford Corrected Testimony, April 11, 2017, Figure 20.

[9] In addition, Dr. Crawford gets his highest implied royalty allocation for Sports in 2013, indicating that if I had included data for 2013 in my regression analysis, it likely would have found an even greater average value for Sports programming.

IV. RESPONSES TO OTHER CLAIMANTS' WRITTEN TESTIMONY

A. DR. ERDEM'S ANALYSIS ON BEHALF OF DEVOTIONAL CLAIMANTS LARGELY CORROBORATES THE BORTZ SURVEY RESULTS, AND HIS CRITICISMS OF THE USE OF REGRESSION ANALYSES IN THIS PROCEEDING ARE WITHOUT MERIT

1. Dr. Erdem's challenges to the use of regression analysis in this proceeding are without merit

16. Although he acknowledges that "Waldfogel-type" regressions may have some value in corroborating survey evidence,[10] Dr. Erdem criticizes the use of regression analysis in this proceeding on two principal grounds. First, he claims that "regression approaches cannot inform the Judges on what the CSOs would have paid for each claimant category in a free market," because CSOs are purchasing distant signal programming in a regulated market. Second, he claims that the regression approach is not valid because it "assume[s] that the 'value' of a program category is measured in minutes of programming."[11] Both of Dr. Erdem's criticisms are unfounded.

17. **First,** Dr. Erdem is wrong that regression approaches like mine or Dr. Crawford's (or those of Drs. Waldfogel and Rosston before us) cannot inform the Judges on what CSOs would have paid for each of the Agreed Categories of programming in a hypothetical free market. As I explained in my original testimony in this proceeding, the regression allows me to determine how much more CSOs pay for each additional minute of a given type of content, holding other factors constant, which is exactly the sort of direct evidence on their willingness to pay for each type of content that one needs to corroborate the Bortz survey results using actual marketplace behavior:[12]

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10 Testimony of Erkan Erdem, Ph.D., *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter, *Erdem Testimony*), p. 18.

11 *Erdem Testimony*, p. 14.

12 See *Israel Testimony*, pp. 11-12. See also *Crawford Corrected Testimony*, p. 13 ("one can exploit the fact that distant broadcast signals are themselves bundles of programming content (and that this content varies across distant signals) to measure their relative marketplace value, even in the presence of regulated prices.")

> Although there is no marketplace price for the distant signal content, marketplace information can be gleaned from CSO carriage decisions and, in particular, what CSOs pay as a function of what they choose to carry. The regression enables me to determine the effective price the CSOs pay for each category of content by determining how much their payments go up with an additional minute of each category of content, holding other relevant factors constant.

18. Dr. Erdem is also mistaken that regression analysis cannot be informative in this context simply because the market is regulated. In past proceedings, the parties have agreed that "the sole governing standard is the relative marketplace value of the distant broadcast signal programming retransmitted by cable systems."[13] And regression analysis is a highly effective tool in this context to use the actual evidence of CSO decisions on distant signal carriage to estimate the average relative value of the Agreed Categories.

19. Indeed, in the 2004-05 cable royalty proceeding, the Judges found the Waldfogel regression helpful to corroborate the 2004-05 Bortz survey results.[14] Similarly, the Copyright Arbitration Royalty Panel found Dr. Rosston's regression analysis useful in corroborating the 1998-99 Bortz survey results.[15] Accordingly, I employed a similar regression analysis here to help the Judges assess the 2010-13 Bortz surveys results.

20. My approach is also entirely consistent with standard methods in economics. Indeed an important purpose of much empirical analysis in economics, particularly "industrial organization" economics, is to use observed behavior under one set of conditions to model what would happen under another set of conditions. For example, studies will often use empirical results in the absence of a particular regulation to predict

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[13] Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57065.

[14] Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57069.

[15] Report of the Copyright Arbitration Royalty Panel to the Librarian of Congress, October 21, 2003, p. 21. As the Librarian of Congress concluded in affirming this decision, regression analysis measures "actual behavior" and responds to past criticism of the Bortz surveys that those surveys measure only "attitudes" rather than "actual behavior." Federal Register /Vol. 69, No. 16 / Monday, January 26, 2004. Page 3615.

the effects of that regulation, or empirical results in a regulated environment to predict the effects of competition following a change in the extent of regulation.[16]

21. **Second,** Dr. Erdem is also incorrect to characterize my regression analysis as a simple time-based study (that is, a study in which valuation is determined only by minutes). I agree with Dr. Erdem that "it would be a significant simplification and mistake to assume that the 'value' of a program category is measured in minutes of programming."[17] In fact, that is why, in all of my analyses, I account for the fact that not all programming minutes are created equal, and thus do not assume value is measured in minutes, but rather account for the differential value of minutes of different types of programming. For example, I consistently find and rely on the fact that Sports minutes are more valuable than other types of programming minutes.[18]

22. Dr. Erdem does not offer a clear alternative to studying the relationship of minutes and royalties, but does offer one specific criticism: that minutes of programming could be replaced by the number of individual programs as a unit of measure, meaning that a 60 minute show or a 30 minute show would each be counted as one unit.[19] This makes no economic sense. The exercise here requires a comparison of the value of different types of programming with different lengths. A baseball game may last three hours, as long as several standard TV shows. Hence, a viewer watching a baseball game could have instead watched, say, six sitcoms in the same period of time. It would make no sense to count each of the programs as one unit, but rather makes sense to determine the value of two possibilities for three hours' worth of content.

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16 See for example Mian Dai and Xun Tang, "Regulation and Capacity Competition in Health Care: Evidence From U.S. Dialysis Markets," *The Review of Economics and Statistics*, December 2015, 97(5): 965–982; Pierre Dubois, Rachel Griffith, Martin O'Connell, "The Effects of Banning Advertising in Junk Food Markets," *Review of Economic Studies* (2017) 0, 1–41; Claudio Lucarelli, Jeffrey Prince, Kosali Simon, "The Welfare Impact of Reducing Choice in Medicare Part D: A Comparison of Two Regulation Strategies," *International Economic Review* Vol. 53, No. 4, November 2012.

17 *Erdem Testimony*, p. 14.

18 *Israel Testimony*, pp. 23-30.

19 *Erdem Testimony*, p. 14.

23. Dr. Erdem's claim that "CSOs may value a short program (e.g., 30-minutes) more than they value a longer program (e.g., 90-minutes) or that they may value a weekly program more than a daily program" does nothing to refute my point that one should compare value by minute.[20] If a 30-minute program is worth more than a 90-minute program, a CSO would surely choose (if possible given other constraints) to replace the 90-minute program with the 30-minute program. But it would also then have an additional 60 free minutes on which to air other valuable content. Only by comparing programming values by minute, as I do in my regression analysis, can one accurately compare the full value of two blocks of content that could fill a given time span.

2. Dr. Erdem's testimony supports a high relative value for Sports programming

24. Dr. Erdem performs several experiments on my regression model.[21] Although I believe that the methodology used in my regression was appropriate and Dr. Erdem's adjustments are unwarranted,[22] I also note that Dr. Erdem's alternative approaches *actually support* my finding of a high relative value on live Sports programming. In particular, Dr. Erdem's model 4B, which he notes is "very broadly comparable to the results from both the

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[20] *Erdem Testimony*, p. 14.

[21] *Erdem Testimony*, p. 14.

[22] There are at least three fundamental problems with Dr. Erdem's experiments, each of which renders them econometrically invalid. First, Dr. Erdem misunderstands the nature of the CDC data, and his calculation of "distant subscribers" double-counts subscribers, and thus results that include this measure are not informative. Second, Dr. Erdem's addition of log transformed and exponential versions of level variables that I already include in my regression model is not standard practice, and I have never seen it used before. Instead, it is an example of simply "fishing" for a specification that changes my result – throwing variables into a model until the result changes. One can nearly always find a way to change a result, but if this is done by simply adding multiple versions of the same variable to the model with no economic justification, it is not informative and cannot invalidate the result. Third, Dr. Erdem is wrong to exclude what he calls "influential observations" in my regression model. The purpose of this regression analysis is to study the relationship established by the full set of data, representing all Form 3 CSOs. Indeed even the authors Dr. Erdem cites for this statistical practice, themselves state "influential data points, of course, are not necessarily bad data points; *they may contain some of the most interesting sample information*." [Emphasis added.] See Belsley, D. E. Kuh, and R. E. Welsch, 1980. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: Wiley, p. 3.

Bortz and Horowitz surveys"[23] and which Mr. Sanders highlights in his testimony,[24] implies a 45 percent share for Sports programming. In addition, the average of Dr. Erdem's various regression models imply a 41.5 percent share of the royalty fund for Sports programming. Both of these results are similar to (indeed higher than) the average result of the 2010-13 Bortz surveys (38.2 percent), and generally in-line with my results and Dr. Crawford's results.

25. More generally, Dr. Erdem's results are broadly consistent with the valuations in the 2010-13 Bortz surveys, showing, for example, the same rank order for Sports, Program Suppliers, CTV and Public Television ("PTV"). (See Table 3.)

Table 3: Comparison of Erdem Regression Results with Bortz, Israel and Crawford

Programming Category	Bortz Survey Average 2010-2013	Israel Regression 2010-2012	Crawford Regression 2010-2013	Erdem Regression 4B 2010-2012	Erdem Regression Average 2010-2012
Sports	38.2%	37.5%	35.1%	45.0%	41.5%
Program Suppliers	31.0%	26.8%	23.4%	22.6%	22.4%
CTV	20.6%	22.2%	19.5%	21.6%	16.3%
PTV	5.1%	13.5%	17.0%	7.0%	7.1%
Devotional	4.6%	0.0%	0.7%	3.8%	2.7%
Canadian	0.5%	0.0%	4.2%	0.0%	0.0%

Source: Israel Testimony, December 22, 2016, Table V-2; Crawford Corrected Testimony, April 11, 2017, Figure 20; Bortz Report, December 22, 2016, Table I-1; Erdem Testimony, March 9, 2017, Exhibit 13

23 *Erdem Testimony*, p. 18.

24 *Sanders Amended Testimony*, p. 18.

B. MR. SANDERS' TESTIMONY ON BEHALF OF DEVOTIONAL CLAIMANTS SUPPORTS THE USE OF THE 2010-13 BORTZ SURVEYS TO DETERMINE ROYALTY SHARES, AND HIS CRITICISMS OF THE REGRESSION ANALYSES IN THIS PROCEEDING ARE WITHOUT MERIT

1. Mr. Sanders correctly concludes that the 2010-13 Bortz survey results should be the basis for determining each program category's royalty share

26. I agree with Mr. Sanders that the 2010-13 Bortz surveys should be the basis for the Judges' allocation of royalty shares among the Agreed Categories of programming.[25] As noted above, my empirical analysis of marketplace outcomes supports the results of the Bortz surveys for royalty allocation. As such, I support the results of the 2010-13 Bortz surveys for the royalty allocation to all parties, including Devotional Claimants.

27. However, I also note that the Judges' prior adjustment of the Devotional Claimants' share was based in part on a conclusion that the 2004-05 Bortz survey results likely represented a ceiling on the Devotional share due to "the amount and significance of non-compensable devotional programming contained on WGN-A during the period."[26] The 2010-13 Bortz surveys included improvements that mitigate (but do not eliminate) the impact of WGNA non-compensability,[27] and hence, using the same logic, the 2010-13 Bortz survey results should be regarded as a ceiling on the Devotional allocation of the 2010-13 royalties. Additionally, the results of my regression and Dr. Crawford's, like those of Dr. Waldfogel in the 2004-05 proceeding, "point[] toward a lower share" for the Devotional category than the Bortz surveys imply.[28]

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25 *Sanders Amended Testimony*, p. 9. ("I believe the Bortz Survey, as structured in the 2004-2005 case and as updated for this 2010-2013 proceeding, identifies the appropriate buyers of retransmission services and presents this category of buyers' views of the relative marketplace value of specific categories of programs.")

26 Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57074.

27 *Bortz Report*, pp. 5-7, 18-19, 27-30, 47-49.

28 Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57069.

2. Mr. Sanders' criticisms of regression analyses in this proceeding are incorrect

28. Mr. Sanders is incorrect in asserting that regression analysis is an inappropriate methodology for this proceeding. In general, his arguments echo Dr. Erdem's criticisms and are incorrect for the same reasons discussed above.

29. Mr. Sanders also takes issue with the use of "independent variables such as numbers of subscribers, number of channels, population served, and the like, which bear a relationship to programming decisions that is tangential at best…. They may yield a result that, while statistically compelling in an illusory manner, is meaningless for the purpose of an allocation phase royalty distribution."[29] Mr. Sander's argument makes no sense as a matter of econometrics. Such variables are also referred to as "control variables" and are a standard component of a regression analysis, used to ensure that my results isolate the effects of additional minutes of programming on CSO payments without instead capturing spurious correlation with other factors that are not controlled for. By using such control variables, my regression analysis is able to tease out the amount that "CSO royalty payments increase with each additional minute of each category of programming content, *holding other relevant factors that determine royalty payments fixed*[.]"[30]

30. I also note that the control variables that I use in my regression are essentially those used by Drs. Waldfogel and Rosston in previous proceedings, and are similar to those used by Dr. Crawford. The reason we have all used such control variables is that they clearly relate to the amount of royalties that CSOs pay for distant signals, and thereby serve as important controls to isolate the main relationship of interest: the relative marketplace value of a minute of the Agreed Categories of programming.[31]

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29 *Sanders Amended Testimony*, pp. 19-20.

30 See *Israel Testimony*, paragraph 34. (Emphasis added)

31 For example, CSO royalties are, in part, a function of the number of CSO subscribers. CSOs pay royalties to the fund based on their gross receipts from the subscribers to whom they transmit distant signals. Therefore, my regression must include a control variable that measures the number of subscribers for each CSO. Other independent variables, such as the number of local broadcast channels a CSO carries, help me to control for demand

C. DR. GRAY'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS RELIES ON FUNDAMENTALLY FLAWED MEASURES OF PROGRAMMING VOLUME AND VIEWERSHIP THAT PROVIDE NO VALID ECONOMIC BASIS FOR DETERMINING RELATIVE MARKETPLACE VALUE

31. Dr. Gray's testimony focuses on "two measures of relative economic value of programming: programming volume and programming viewership."[32] For the purposes of his testimony, programming volume is the "total volume of minutes of programming retransmitted by CSOs" and viewership is the "[a]udience size, which is determined through program viewership."[33] Although he presents and discusses results on programming volume, Dr. Gray ultimately concludes that programming volume is an "imperfect" and "insufficient" measure of relative marketplace value.[34] But as to his viewership measure, he concludes that ". . . relative program viewership provides a reasonable and reliable measure of the relative economic value of distantly retransmitted programing."[35]

32. Dr. Gray's conclusions are without any economic merit. Neither of Dr. Gray's metrics – volume or viewing – provides a sound measure of the relative economic value of the Agreed Categories.

- His measures of programming volume are meaningless, as they do not account for the number of CSOs that transmit each network, let alone the number of CSO subscribers receiving programming, and thus do not show the extent to which

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factors that might affect a CSO's willingness to pay for additional programming – if a CSO already has an abundance of non-distant broadcast signals, it will less willing to pay for distant signals, all else equal. This relationship is confirmed in my analysis. See *Israel Testimony*, Table V-1, p. 18, showing a negative relationship between the number of local broadcast channels carried by a CSO and the distant signal royalties paid by that CSO, holding all other factors constant.

32 Corrected Amended Testimony of Jeffrey S. Gray, Ph.D., *In re Distribution of Cable Royalty Funds*, ~~April 3, 2017,~~January 22, 2018, (hereinafter, *Gray Corrected Amended Testimony*), p. ~~8.~~9.

33 *Gray Corrected Amended Testimony*, p. ~~9.~~9-10.

34 *Gray Corrected Amended Testimony*, pp. ~~9,~~10, ~~17.~~11.

35 *Gray Corrected Amended Testimony*, p. ~~20.~~22.

CSOs are retransmitting (purchasing) that programming. In any event, as Dr. Gray appears to acknowledge, relative volume does not equate with relative value.

- His reliance on programming viewership as a measure of relative economic value ignores the fact that not all programming minutes are equal: Viewers value minutes of different content differently, as I (and others) have shown for the Agreed Categories in this case. As such, viewership minutes do not determine the value of programming aired on distant signals. Rather, valid estimates of royalty shares in this proceeding must account for variation in the value per minute across categories. The Bortz surveys provide a reliable measure of these valuations, as my and Dr. Crawford's regression analyses confirm.

1. Dr. Gray's analysis of programming volume is incorrect and does not reflect relative marketplace value

33. Dr. Gray calculates what he calls "relative volume of programming by claimant category," which he admits is an "imperfect" measure of relative marketplace valuations.[36] According to Dr. Gray, the "total volume of minutes of programming *retransmitted* by CSOs effectively represents the volume of programming purchased by the CSOs . . . ."[37] He purports to calculate that volume by measuring the number of distant signal programs and minutes of those programs based on his sample of television stations retransmitted during 2010-13. In Table 1 of his testimony, Dr. Gray reports shares of "All Volume" for each of the Agreed Categories, which show a Sports share of less than 1 percent for each year from 2010 -13 and a Program Suppliers share of approximately 50 percent.[38]

34. Beyond his own admission that volume is an imperfect measure of valuation, Dr. Gray's Table 1 is flawed and misleading, because it does not account for the number of CSOs that receive each distant signal, let alone the number of subscribers to whom the programming is retransmitted. Thus, it does not measure the "total volume of minutes

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36 See *Gray Corrected Amended Testimony*, pp. 11, ~~15~~16-~~17.~~18.

37 See *Gray Corrected Amended Testimony*, p. 9 (emphasis added).

38 See *Gray Corrected Amended Testimony*, pp. ~~15-~~17.

retransmitted" by CSOs, as Dr. Gray claims. Instead, Dr. Gray measures the volume of minutes televised by distant signals without regard to the number of CSOs that retransmitted those minutes or to the number of distant subscribers to whom CSOs retransmitted those minutes. Dr. Gray's analysis weights the minutes by a sampling weight, which is unrelated to the number of CSOs that retransmit the signal.[39]

35. Hence, Dr. Gray's volume analysis is unrelated to how many (or few) CSOs retransmitted that programming or how many (or few) CSOs' subscribers received it. As a result, a 120 minute movie broadcast on a single station retransmitted to 500 distant subscribers could be given equal weight to a 120 minute NBA telecast on WGNA, which hundreds of CSOs retransmitted to over 40 million distant subscribers.[40] Therefore, Dr. Gray's measure of volume does not properly account for the fact that distant signals are retransmitted by various CSOs to subscribers.[41]

36. Dr. Crawford has presented an analysis that demonstrates the large impact of Dr. Gray's errors. In particular, Dr. Crawford's Figure 12 accounts for both the number of CSOs that transmit a distant signal and the number of subscribers receiving it, yielding a subscriber-weighted share of compensable minutes for Sports of roughly 5.9 percent, as compared to Dr. Gray's figure of a less than 1 percent Sports share. See Table 4, below.

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39 Dr. Gray's sampling weights simply adjust for the sampling procedure he has implemented and have nothing to do with the number of CSOs who retransmit the signal or the number of subscribers who receive it. For example, his sampling weight has a correlation of -0.07 with the number of distant subscribers who receive the signal (or the number of CSOs that retransmit the signal), implying that the two phenomenon are statistically unrelated. Indeed, a version of Dr. Gray's Table 1 that is unweighted looks very similar to Dr. Gray's own results in Table 1. See my Technical Appendix for details.

40 This flaw is highly consequential and not simply theoretical. As I noted in my original testimony, some distant signals are carried by many more cable systems than others. For example, during the period 2010-12, WGN was carried in 4,127 system-periods, whereas WIAT is carried in only 10 system-periods. See *Israel Testimony*, p. Appendix B-5.

41 See Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. by William E. Wecker, Ph.D. and R. Garrison Harvey, *In re Distribution of Cable Royalty Funds*, September 15, ~~2017~~2017, amended February 12, 2018 (hereinafter, *Wecker Testimony*), pp. 4-10.

Table 4: Comparison of Gray and Crawford Measures of Volume

Claimant Group	2010-2013 Gray	2010-2013 Crawford
Sports	0.7%	5.9%
Program Suppliers	48.3%	33.3%
CTV	14.4%	15.6%
PTV	27.8%	36.3%
Devotional	7.8%	2.3%
Canadian	1.1%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Gray Corrected Amended Testimony, January 22, 2018, Table 1.

37. I also note that the Sports share of program minutes actually received by subscribers (volume) appears to be going *up* over time, indicating that if volume of minutes has any probative value for shares of the royalty fund, the Sports share is going up over time. A calculation similar to Dr. Crawford's was performed for the 2004-05 proceeding by Dr. Richard Ducey on behalf of CTV claimants.[42] In Table 5, below, I compare the subscriber weighted shares of compensable minutes calculated in 2004-05 by Dr. Ducey to those calculated in 2010-13 by Dr. Crawford. I note that Sports share has increased slightly from 4.5 percent to 5.9 percent. However, Program Suppliers' share has decreased from 50.1 percent to 33.3 percent.

[42] Testimony of Richard V. Ducey., *In re Distribution of Cable Royalty Funds*, June 1, 2009, (hereinafter, *Ducey Testimony*), Exhibit 8.

Table 5: Share of Compensable Minutes by Claimant Group Weighted by Subscribers

	2004-2005	2010-2013
Claimant Group	**Ducey**	**Crawford**
Sports	4.5%	5.9%
Program Suppliers	50.1%	33.3%
CTV	15.5%	15.6%
PTV	22.3%	36.3%
Devotional	2.7%	2.3%
Canadian	4.5%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Ducey Testimony, June 1, 2009, Exhibit 8.

38. My analysis of cable network program expenditures also shows that measures of volume do not translate directly into value. Below I reproduce Table V-5 from my December 22, 2016 testimony (see Table 6).[43] This analysis shows that despite the relatively small share of JSC programming hours transmitted (1.06 percent) by the top 25 cable networks during 2010-13, that programming nevertheless commanded more than 22 percent of the top 25 cable networks' 2010-13 programming budgets. Said another way, JSC programming is worth almost 30 times more per programming hour than non-JSC programming for the top 25 cable networks in 2010-13.

[43] See *Israel Testimony*, pp. 25-26.

Table 6: Cable Content Analysis 2010-13, Summary of Top 25 Networks

Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
	[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
JSC	9,274.0	15,164,368.9	$12,524.7	$1,350,513.0	$0.826
Non-JSC	866,726.0	496,492,970.2	$42,702.0	$49,268.2	$0.086
JSC / Non-JSC	0.01	0.03	0.29	27.41	9.60
JSC % of Total	1.06%	2.96%	22.68%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

39. Individual cable networks with a mix of JSC and other programming show a similar pattern. Below, I reproduce table V-6 from my December 22, 2016 testimony (see Table 7), an analysis of content expenditures for TBS and TNT. This analysis shows that JSC's relatively small share of Total Programming Hours on TBS (1.95%) and TNT (2.79%) translates into a 44.40 percent and 45.46 percent share, respectively, of the amount that the cable networks spent on programming. In other words, an hour of JSC programming commands more than 40 times the value of an hour of non-JSC programming on TBS, and nearly 30 times the value of non-JSC programming on TNT.

Table 7: Cable Content Analysis 2010-13, TBS & TNT

Network	Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
		[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
TBS	JSC	684.0	1,220,722.6	$1,031.0	$1,507,370.6	$0.845
	Non-JSC	34,356.0	20,880,757.4	$1,291.2	$37,581.7	$0.062
	JSC / Non-JSC	0.02	0.06	0.80	40.11	13.66
	JSC % of Total	1.95%	5.52%	44.40%		
TNT	JSC	977.0	2,513,281.9	$2,042.0	$2,090,056.2	$0.812
	Non-JSC	34,063.0	29,162,878.1	$2,450.2	$71,931.9	$0.084
	JSC / Non-JSC	0.03	0.09	0.83	29.06	9.67
	JSC % of Total	2.79%	7.93%	45.46%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

40. In sum, simply correcting Dr. Gray's error of failing to account for how many CSOs retransmitted programming (and how many subscribers they have), significantly changes his results. Importantly, however, even with this change, one could not rely on the volume of minutes received by subscribers to determine relative valuations of the Agreed Categories without accounting for the differences in the value of each minute, a topic I discuss in greater depth in the next section in the context of viewership minutes.

2. Dr. Gray's analysis of program viewership provides no valid method for determining relative marketplace value

41. Dr. Gray also calculates the total amount of what he terms "viewing" of the Agreed Categories of programming on distant signals. In his Table 2, Dr. Gray calculates that live Sports programming constitutes roughly ~~2.1~~5.3 to ~~4.8~~9.2 percent of 2010-13 distant viewing.[44]

[44] See *Gray Corrected Amended Testimony*, pp. 19-20. ~~See also Wecker Testimony, p. 27, and Written Rebuttal Testimony of Susan Nathan *In re Distribution of Cable Royalty Funds*, September 15, 2017 (hereinafter, *Nathan Rebuttal Testimony*), p. 3.~~

42. Dr. Gray's calculation of minutes viewed provides no reliable basis for determining the relative valuation of the Agreed Categories, most fundamentally because it treats all viewing minutes as the same and thus does not account for the fact that minutes of different types of programming have different values. Dr. Gray's assumption that minutes viewed can be treated equally in determining value is flawed for many reasons, most notably that it fails to consider the number of minutes of each type of content that is available. If the same number of minutes of all types of content were available, then the total amount of each that viewers choose to consume could indicate their relative value. But given the smaller number of available minutes of Sports programming, one cannot support such a conclusion. Many viewers may wish there were more Sports programming available, and choose to watch other programming *only as a second choice* because Sports programming is not available at certain times. In that context, a smaller number of minutes of Sports programming may be worth far more to viewers than a much greater number of other types of programming, which they value less but watch as a poor substitute when live Sports is not on.[45]

43. A further problem with Dr. Gray's analysis of viewing minutes is that it ignores that it is CSOs (not viewers) that pay for programming, using such programming to fill out their channel lineups. Hence, the appropriate base for analysis of value is the number of minutes aired by CSOs (accounting for the proportion of its subscribers that receive the programming) such as I use in my regression analysis.

44. My regression methodology accounts for these issues by determining the difference in valuation across minutes of different types of programming and multiplying this by minutes aired by CSOs to determine relative values. Most notably, as described in my previous written testimony, my regressions show that a minute of Sports programming is more valuable than a minute of Program Suppliers programming. Below I reproduce Table

[45] As an analogy, consider that potatoes are much less expensive and more widely available than are blueberries. In 2013, U.S. consumers consumed over 33 pounds per person of fresh potatoes, compared with roughly one and a half pounds of fresh blueberries per person. But the price of blueberries ($4.73) was roughly 8x greater than potatoes ($0.56), per pound. Therefore, one cannot conclude that higher consumption equals higher value.

V-2 from my testimony of December 22, 2016 (see Table 8).[46] It shows that an additional minute of Program Suppliers programming is much less valuable ($0.469) than an additional minute of Sports programming ($4.836). Hence, the fact that CSOs carry many more prorated distant signal minutes of Program Suppliers programming (51,261,616) than they do of Sports programming (6,962,722) cannot be used to infer that they place more value on Program Supplier programming than they do on Sports programming; an adjustment for the value of each type of content per minute is required, such as I provide in my analysis.

Table 8: Previous Israel Table V-2, Royalty Share Allocation

Claimant Group	Value of an Additional Minute[1]	System and Prorated DSE Weighted Compensable Minutes	Value of Minutes	Implied Share of Royalties
[A]	[B]	[C]	[D] = [B] * [C]	[E] = [D] /(89,701,903)
Sports	4.836**	6,962,722	33,674,484	37.54%
Program Suppliers	0.469***	51,261,616	24,058,506	26.82%
Commercial TV	1.01***	19,677,607	19,873,956	22.16%
Public Broadcasting	0.66**	18,322,702	12,094,957	13.48%
Devotional	-0.701***	4,384,240	0	0.00%
Canadian	-0.973***	4,839,825	0	0.00%
Total		**105,448,713**	**89,701,903**	**100.00%**

Source: TMS/Gracenote; Cable Data Corporation; Kantar Media/SRDS

Notes: *, **, and *** indicate results are significant at the 90, 95, and 99 percent confidence levels, respectively.

[1] Minutes prorated.

45. Returning to my analysis of cable network expenditures, it shows that measures of viewership also do not translate directly into value. Below I reproduce Table V-5 from my December 22, 2016 testimony (see Table 9).[47] This analysis shows that despite JSC's relatively small share of household viewing hours (HHVH, 2.96 percent) for the top 25 cable networks, JSC programming nevertheless commands more than 20 percent of the top 25 cable networks' programming budgets. Said another way, JSC programming is worth

46 See *Israel Testimony*, p. 20.

47 See *Israel Testimony*, pp. 25-26.

roughly 10 times more per household viewing hour than non-JSC programming for the top 25 cable networks.

Table 9: Cable Content Analysis 2010-13, Summary of Top 25 Networks

Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
	[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
JSC	9,274.0	15,164,368.9	$12,524.7	$1,350,513.0	$0.826
Non-JSC	866,726.0	496,492,970.2	$42,702.0	$49,268.2	$0.086
JSC / Non-JSC	0.01	0.03	0.29	27.41	9.60
JSC % of Total	1.06%	2.96%	22.68%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

46. Focusing again on the individual cable channels, TBS and TNT, which show a mix of JSC and non-JSC programming, exhibit the same relationship between household viewing hours and value (See Table 10, below). Specifically, although JSC programming represents only 5.52 percent of HHVH on TBS and 7.93 percent of HHVH on TNT, that programming represents 44.40 percent and 45.46 percent of program expenditures, respectively. This means that the value of an hour of JSC viewing is worth roughly 13 times more than a viewing hour of non-JSC programming on TBS, and nearly 10 times more than a viewing hour of non-JSC programming on TNT.

Table 10: Cable Content Analysis 2010-13, TBS & TNT

Network	Category	Total Programming Hours	Total HHVH (000)	Expeditures ($M)	Expenditures per Hour of Programming	Expenditures per Hour of Viewing
		[A]	[B]	[C]	[D] = [C] / [A]	[E] = [C] / [B]
TBS	JSC	684.0	1,220,722.6	$1,031.0	$1,507,370.6	$0.845
	Non-JSC	34,356.0	20,880,757.4	$1,291.2	$37,581.7	$0.062
	JSC / Non-JSC	0.02	0.06	0.80	40.11	13.66
	JSC % of Total	1.95%	5.52%	44.40%		
TNT	JSC	977.0	2,513,281.9	$2,042.0	$2,090,056.2	$0.812
	Non-JSC	34,063.0	29,162,878.1	$2,450.2	$71,931.9	$0.084
	JSC / Non-JSC	0.03	0.09	0.83	29.06	9.67
	JSC % of Total	2.79%	7.93%	45.46%		

Sources: Economics of Basic Cable 2015; various articles from Sports Media Watch, Sports Business Daily, ESPN Media Zone, TV By the Numbers, Soccer America, NY Times, USA Today, WSJ, Morgan Wick, and other various sources. See my underlying documents for a full list of sources.

47. In sum, Dr. Gray is wrong to focus solely on volume and viewership to estimate relative marketplace value for the Agreed Categories. His measure of volume is simply incorrect and neither measure accounts for the obvious fact that not all minutes are equally valuable. Proper measures must account for the variation in value across minutes of different types, either by directly asking CSOs to report on the value of the programming (as the Bortz survey does), by using a regression analysis to determine value per minute which can then be multiplied by total minutes (as my first method does),[48] or by relying on the values paid for Sports and non-Sports programming on cable channels (as my second method does).

D. DR. STECKEL'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS IS NOT VALID ECONOMIC ANALYSIS

48. Dr. Steckel claims that CSO surveys, like those performed by Bortz on behalf of Sports programming and Mr. Horowitz on behalf of Program Suppliers, are not appropriate sources of information for the Judges to use in determining the relative marketplace value

[48] As does the regression analysis by Dr. Crawford for Commercial TV Claimants.

of the Agreed Categories.[49] He offers several reasons for this opinion and, based on those reasons, he advocates for the use of market data or surveys of customers instead of CSO surveys.[50]

49. Dr. Steckel is simply incorrect as a matter of economics. The most relevant source of information on the value of a product is the views of the buyers. Hence, in this case, the most relevant source of information on the value of distant signal programming is the views of CSO executives, who are the buyers of the programming and who make such programming decisions as part of their job. Therefore, the Bortz survey of CSOs should be the primary source of information for the Judges.[51] This is especially true given that regression analyses using available marketplace data on distant signals corroborate the findings of the Bortz surveys, as do market data on cable network expenditures.

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49 Dr. Steckel's opinion in this proceeding is contradicted by much in the previous record, including the Judges themselves, various expert testimony (including my own), and the United States Court of Appeals for the District of Columbia Circuit. See for example: The Judges (Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57065. "Having carefully reviewed and considered all of the evidence in the record, the Judges find that the values of the program categories at issue among these contending claimants are most reasonably delineated by a range bounded by certain results indicated primarily by the Bortz constant sum survey"); expert testimony (e.g., Written Direct Testimony of Dr. Robert Crandall, 2004-05 Phase I (JSC Written Direct Statement Ex. No. 4), 1998-99 Phase I (JSC Written Direct Statement Ex. No. 6), 1989 Phase I (JSC Written Direct Statement Ex. No. 7); Written Direct Testimony of Michelle Connolly, Ph.D., *In re Distribution of Cable Royalty Funds*, December 22, 2016 (hereinafter, *Connolly Testimony*) (supporting Bortz survey and citing prior testimony of experts for CTV, PTV, Canadian and Devotional claimants supporting Bortz survey); and the D.C. Circuit (Program Suppliers v. Librarian of Congress, 409 F.3d 395, 402 (D.C. Cir. 2005), ("Nor did the CARP act unreasonably in declining to rely on Nielsen for direct evidence of viewing, as Bortz adequately measured the key criterion of relative market value. Moreover, as the CARP put it, Bortz 'subsumes inter alia all viewing data that a CSO might consider when assessing relative value of programming groups.").

50 Direct Testimony of Joel Steckel, Ph.D., *In re Distribution of Cable Royalty Funds*, December 22, 2016 (hereinafter, *Steckel Testimony*), pp. 7-8.

51 For ease of reference, when referring to CSO surveys for the purposes of responding to Dr. Steckel, I will refer to the Bortz surveys. See Section IV.F, below, which explains why my analysis supports the Bortz survey as superior to the Horowitz surveys.

1. In the relevant hypothetical market, the CSO is the buyer and thus the relevant focus of the survey

50. Dr. Steckel points to the Bortz surveys' reliance on CSO respondents to provide relative valuations for the Agreed Categories as a weakness of the survey. He believes that instead of the opinions of cable executives, one should focus on the opinions of subscribers. However, in both real world and the hypothetical free market for distant signals, the CSO is the buyer of the content. Hence, Dr. Steckel is wrong as a matter of economics: the relevant opinion on value is the opinion of the buyer, which is what the Bortz Survey captures.

51. In fact, the nature of distant signals is such that the value placed on the content by the CSO is the sole determinant of price for distant signals in a hypothetical free market. In general, as a matter of economics, the price for a product is determined by the marginal benefit to buyers and the marginal cost to sellers. In this case, however, the marginal cost to produce distant signals is zero in all cases, as the signals are simply retransmitted signals that have already been produced. Thus, the only variation in a hypothetical free market for distant signals would come from variation in the marginal benefit that CSOs would derive from retransmitting different distant signals. Therefore CSOs' valuation on distant signals is the relevant determinant of price in a hypothetical free market.

52. Dr. Steckel's claim that subscriber surveys would be superior to CSO surveys is misguided. Arguing that one should survey cable subscribers instead of cable operators is to argue that one should not ask the actual buyers what they will pay, but rather the people whose valuations the operators are aggregating. This makes no economic sense. An analogy might be that instead of asking the parents how much they would pay for a vacation, you should survey all the family members (i.e. children) whose views the parents are aggregating in arriving at a willingness to pay for various vacation options. This method could not be as accurate as surveying parents directly, as the survey analyst would then have to decide how to aggregate the views of the various family members into an overall value, when what really matters is how the *parent*, who pays for the trip, would aggregate those values. Similarly, surveying subscribers would leave the analyst to aggregate those values to make inferences about CSO valuation, when the relevant

question is how the CSOs perform such aggregation, which can be answered by asking them directly.[52]

53. In fact, Dr. Steckel ultimately agrees with this. He says "[i]f you want to know if customers will buy a product, ask them. If you want to know why customers are not buying a product, ask them. If you want to know what customers (*i.e.*, the market) value, ask them."[53] I agree with Dr. Steckel's reasoning, but the customers *are* the CSOs.

54. Dr. Steckel also argues that "[i]f managers really understood what their customers value, every product would be a success. In fact, we know over half of new industrial products fail."[54] This argument is entirely beside the point. The purpose of the Bortz survey is not to ask CSOs, as *suppliers*, about the value of new product, rather it is to ask CSOs as *buyers* what they would have spent, on a relative basis, for the Agreed Categories of programming, the relevant question in determining the valuation of those program categories. Dr. Steckel's argument would apply if Bortz were asking the network executives at the distant signal (e.g. WGN executives) how much they think their content is worth. In that case, Dr. Steckel would be correct that those executives may not know how much various content is worth to buyers. In contrast, the CSOs are the buyers of the distant signals. Therefore the CSOs should be the respondents to the survey valuing distant signal programming.

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52 See also *Connolly Testimony*, pp. 18-19. On the point of CSOs as buyers, Dr. Connolly states: "Moreover, given that the respondents of the Bortz survey are internalizing their beliefs about subscriber preferences when responding to questions about the relative value of categories of programming, this aspect of the market is reflected in the Bortz survey." In addition, Dr. Connolly quotes Dr. Steven Wildman, who correctly concludes that "[b]ecause CSOs are the purchasers in the relevant marketplace and subscriber demands are filtered through them, the CSO survey results must be considered more primary and as more directly relevant to the determination of appropriate compensation than the subscriber surveys."

53 See *Steckel Testimony*, pp. 40-41.

54 See *Steckel Testimony*, p. 41.

2. CSO executives are experts in valuing content

55. Dr. Steckel believes that cable executives would be unable to respond accurately to the Bortz surveys, because they would give biased answers based on "intuition- and heuristics-based decision-making processes."[55] In particular, he says that cable executives cannot be expected to value programming, because they "do not make decisions about individual programs or the various categories of programming employed in this proceeding. They make decisions about television stations and cable networks."[56] This argument is incorrect.

56. The idea that cable executives do not think about underlying types of programming, but only think about networks as a whole, flies in the face of the realities of the cable television industry. In my own work, I interact with both cable executives and content providers regularly. Their discussions about what certain networks are worth – both how cable executives value them and how networks market themselves – are all about breaking down the value of the underlying content. One particularly salient example: as cable executives decide what TBS and TNT are worth, they are directly evaluating the individual value of the sports content, the original content, and the reruns. When they consider what HBO is worth, they consider "Game of Thrones", other new content, and movies. In fact, cable executives change their entire promotional strategy when "Game of Thrones" premieres on HBO, indicating that they are focused on the underlying shows, not the network generically. When they decide what to pay for an RSN, they value the Sports programming separately from the filler programming. Cable executives do have the expertise and experience to look across their networks and separately value content along the lines of the Agreed Categories; in fact, this is central to their day to day jobs.[57]

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55 See *Steckel Testimony*, pp. 21-22, 28-34.

56 See *Steckel Testimony*, p. 23.

57 See Written Rebuttal Testimony of Allan Singer, September 15, 2017, p. 11; Written Rebuttal Testimony of Daniel M. Hartman, September 15, 2017, p. 1-3, 16-18.

3. Dr. Steckel's discussion of marginal vs. total values is incorrect

57. Dr. Steckel argues that the Bortz survey captures only the "marginal return" (that is, the value created by one more minute of programming) of each category, whereas the marketplace value is captured by the "total return."[58] This is simply incorrect.[59]

58. In fact, the Bortz survey asks respondents to focus on the non-network programming on the distant signals they carry, and then asks for the relative value of ***each type of programming***, not the marginal value of one more minute of the programming.[60] And then it clarifies that respondents should consider how they would divide up a fixed budget for "all the programming" broadcast on those distant signals. So this question is not asking how much extra they would spend for one additional minute or hour of the programming; it is asking how much they would spend for "all" of each category of programming. Hence this is exactly the right question: it is "marginal" only in the sense that it takes ***other, network and cable*** programming as given, but it then asks for the total value of the full bucket of minutes of each type of programming broadcast by the distant signals. In this way, it captures the total value of each category of distant signals – not just the value of the last minute – while correctly recognizing that these distant signals are being added to a lineup of other programming.

59. Marketplace behavior for other types of programming (e.g. cable networks) confirms that the Bortz survey asks the right question. For example, in my experience working with multiple CSOs, when they negotiate for a given cable network (or bundle of networks) – from Disney for example – they determine the price they are willing to pay by starting from a base of the other networks they carry and then asking how much additional profit they can make by adding the Disney networks, as a whole. And in doing so, they

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58 See ***Steckel Testimony***, p. 26 ("any presumed equivalence between resource allocations and marketplace value rests on total return, not marginal return.")

59 Previous testimony on this topic directly contradicts Dr. Steckel. See Testimony of Robert W. Crandall, Ph.D., (JSC Written Direct Statement Ex. 7), pp. 9-14. ("It is this latter measure of value – the total value as represented by the area under the demand curves – that is captured by the Bortz survey.")

60 See ***Bortz Report***, pp. B-5 & B-6, questions 4a and 4b.

consider the value of the various categories of programming (sports on ESPN, animation, etc.) that come with the Disney networks, again as a whole. This process, carried out by each CSO, determines the overall marketplace value of the content across all CSOs. And it's exactly the process that the Bortz survey mimics, by asking how much CSOs would allocate to each category of distant signal programming, in total.

4. CSO management of multiple systems does not invalidate the Bortz Survey results

60. Dr. Steckel also argues that the fact that many survey respondents manage multiple cable systems would introduce ambiguity and bias into the survey results.[61] However, this concern is without basis. First, it ignores that the Bortz survey asks very system specific questions about the precise distant signals carried on each system during the relevant period, so confusion should not be an issue.[62] And, even where an executive was the respondent for more than one system, in the Bortz survey a separate questionnaire was administered for each system.[63] Second, cable executives are generally responsible for a *large and changing* number of systems and thus must determine the value of content on the various systems as part of their day to day job. Hence, Dr. Steckel is once again asserting that cable executives are not qualified to answer questions at the heart of their responsibilities, an unreasonable assertion for which he provides no support.

5. Analysis of marketplace data corroborates the Bortz surveys

61. Finally, even if one were to accept any of Dr. Steckel's criticisms, and thus question the accuracy of survey results, the appropriate next step would be to make sure those

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61 See *Steckel Testimony*, pp 25-26.

62 See for example, *Bortz Report*, p. B-3, question 2a. "Industry data indicate that your system serving (ENTER COMMUNITY LISTED ABOVE; i.e., primary community from SOA) and nearby communities carried the following broadcast stations from other cities in 2010", after which the survey administrator reads off individual distant signal channels by call letters.

63 *Trautman Corrected Rebuttal Testimony*, p. 43 n.29. In contrast, in the Horowitz survey when an executive was the respondent for more than one system, "he/she was only asked to respond to one survey for all the systems with the same channels." Corrected Testimony of Howard Horowitz, *In re Distribution of Cable Royalty Funds*, April 25, 2017 (hereinafter, *Horowitz Corrected Testimony*), p. 8.

results are corroborated by actual marketplace evidence. Indeed, Dr. Steckel appears to agree with this approach: He states his preference for the analysis of "market results" and data on "transactions," as opposed to surveys.[64] In this case, actual market result and data on transactions *corroborate* the Bortz survey results. In particular, as explained above, my regression results (as well as Dr. Crawford's) and my analysis of cable network expenditures corroborate the Bortz surveys' findings. Therefore, even if one takes Dr. Steckel's recommendation and relies on actual marketplace data, the Bortz survey results are simply bolstered.

E. MR. MANSELL'S TESTIMONY ON BEHALF OF PROGRAM SUPPLIERS MISINTERPRETS THE IMPLICATIONS OF THE RAPIDLY GROWING SOURCES OF CONTENT

62. Mr. Mansell concludes "that over the past 30 years, the number of live professional and college team sports games on local over-the-air TV stations has significantly declined."[65] In support of this opinion, Mr. Mansell offers a limited history of Sports broadcasting, describing the expansion of Sports programming to cable, the internet and mobile devices.

63. Mr. Mansell's analysis is flawed in at least two fundamental ways. **First**, in his brief summary of this history of Sports programming, Mr. Mansell skips over the most relevant point: Even as the sources of supply of Sports content have expanded, its value (overall and per minute) has remained high. Indeed, Mr. Mansell's own testimony shows the continued value and desirability of Sports programming, as he refers to bidding wars for the Sports programming that has migrated from broadcast networks to RSNs and national broadcasts,[66] and he affirmatively demonstrates that Sports programming is valuable.[67]

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64 See *Steckel Testimony*, p. 39.

65 Corrected Testimony of John Mansell, *In re Distribution of Cable Royalty Funds*, March 9, 2017 (hereinafter, *Mansell Corrected Testimony*), p. 4.

66 See *Mansell Corrected Testimony*, p. 10.

67 See *Mansell Corrected Testimony*, p. 36.

64. Because it ignores the ongoing high value of sports content, Mr. Mansell's analysis is ultimately irrelevant. The statistical and survey methodologies used by myself, Dr. Crawford, and Bortz compute the value of the various categories of programming *given whatever changes have occurred in the marketplace*. For example, my analysis uses data on actual minutes of distant signal content during the relevant period, as well as data on royalties paid by CSOs during the same period, to estimate how CSOs valued the broadcasts according to their Agreed Categories. More generally, to the extent there have been changes in the availability of sports content (or Program Suppler content) from various sources, the data during the relevant time period speak for themselves on the effect of the changes. Put simply, the results of the Bortz surveys, my analysis, and Dr. Crawford's analysis answer the question of value, *reflecting the effect of all industry trends*, whether those discussed by Mr. Mansell or others.[68]

65. Moreover, available data show that Mr. Mansell's conclusion is wrong as a matter of fact, as it pertains to distant signal retransmissions during 2010-13. While Mr. Mansell may be correct that there has been a gradual migration of Sports programming to cable channels and other outlets over the past thirty years, for the comparatively shorter time period between 2004-05 and 2010-13, the relative amount of compensable Sports programming retransmitted on distant signals actually increased. Below I reproduce as Table 11 an analysis that I performed above, comparing compensable minutes by claimant group in 2004-05 as compared with 2010-13.[69] As this table shows, the percentage of Sports minutes increased slightly from 4.5 percent in 2004-05 to 5.9 percent in 2010-13. Therefore, at least as it affects distant signal retransmission in the recent past, Mr. Mansell's implication that the quantity of Sports programming has declined is incorrect.

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[68] The Judges reached the same conclusion in the 2004-05 proceeding. See Federal Register /Vol. 75, No. 180 / Friday, September 17, 2010. Page 57070 n.18. ("Various arguments are made by some parties concerning whether or not the Judges must consider or require proof of changed circumstances, separate and apart from the estimates of relative value presented by the parties. We find, as did the 1998–99 CARP, that changed circumstances are embedded within the methodologies that provide reliable estimates of relative valuations and, therefore, have already been accounted for and are subsumed within the calculus of results. See 1998–99 CARP Report at 16, 31–2.")

[69] See Table 5, above.

Table 11: Share of Compensable Minutes by Claimant Group Weighted by Subscribers

	2004-2005	2010-2013
Claimant Group	**Ducey**	**Crawford**
Sports	4.5%	5.9%
Program Suppliers	50.1%	33.3%
CTV	15.5%	15.6%
PTV	22.3%	36.3%
Devotional	2.7%	2.3%
Canadian	4.5%	6.6%
Total	**100.00%**	**100.00%**

Source: Crawford Corrected Testimony, April 11, 2017, Figure 12.
Ducey Testimony, June 1, 2009, Exhibit 8.

66. **Second**, Mr. Mansell's analysis overlooks the broader implications of the rapidly evolving media environment, which have had a disproportionately negative impact on the value of other categories of programming, and in particular Program Suppliers, while the value of Sports programming has been remained high. Contrary to Mr. Mansell's conclusions, the industry recognizes that the category of programming that has primarily lost value due to the explosion of content is not live Sports but rather Program Supplier content.[70] This has occurred because the relevant period saw the explosion of Subscription Video On-Demand (SVOD) services like Netflix, Hulu and Amazon, and a general explosion in available content similar to that offered by Program Suppliers. Indeed, by the end of 2013, Netflix had more than 30 million U.S. subscribers,[71] and by the third quarter of 2013, Netflix was streaming about 5 billion hours of video globally, virtually all of it Program Suppliers programming.[72] The explosion of content has thus particularly affected

[70] http://variety.com/2016/tv/news/peak-tv-2016-scripted-tv-programs-1201944237/ . During 2010-13, the number of basic cable original scripted shows more than doubled. These statistics only account for the number of new shows, and does not account for the explosion of previously viewed content throughout cable, cable on-demand, and SVOD services.

[71] https://www.nytimes.com/2014/01/23/business/media/growth-of-netflix-subscribers-surpasses-analysts-expectations.html

[72] http://variety.com/2014/digital/news/netflix-to-focus-on-adding-higher-rated-and-exclusive-titles-cfo-says-1201187028/

Program Supplier content.[73] Indeed, accepted wisdom today is that the traditional, linear TV model (on which distant signals air) is more dependent on Sports than ever.[74]

F. MY REGRESSION ANALYSIS DOES NOT CORROBORATE THE FINDINGS OF THE HOROWITZ SURVEYS PERFORMED ON BEHALF OF PROGRAM SUPPLIERS

67. The 2010-13 Horowitz surveys (Horowitz surveys) were developed by Howard Horowitz with the intention of replicating the "methods and procedures of the Bortz Survey that was done for the 2005 royalty year" but with certain modifications.[75] As one example, particularly relevant to my regression analysis, Mr. Horowitz adds a new category to his survey method: "Other sports," meant to specify non-team sports programming such as horse racing and figure skating, which is not attributable to Joint Sports Claimants, but rather is attributable to Program Suppliers.[76]

68. My regression results, as well as those of Dr. Crawford corroborate the Bortz survey results and fail to corroborate the Horowitz survey results. Hence, actual marketplace evidence supports use of the Bortz survey, not the Horowitz survey, and rejects Mr. Horowitz's claim that not including a separate "Other Sports" category invalidates the Bortz results.

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73 http://articles.latimes.com/print/2012/sep/30/entertainment/la-et-st-homeland-market-20121001. Viewership for individual scripted shows had decreased drastically by the relevant time period.

74 http://variety.com/2013/tv/news/sports-fans-to-spend-more-money-to-watch-favorite-teams-1200577215/ . "The price of TV broadcast rights for sports in the age of time-shifted viewing has soared. After all, it's high-demand content that viewers don't DVR. And unlike other video entertainment, it's not available from Netflix or other Internet services." See also http://www.reuters.com/article/us-facelxlok-mlb-idUSKBN1602MY and https://www.digitaltrends.com/social-media/facebook-and-twitter-are-trying-to-acquire-rights-to-stream-live-tv-content/ , which show that providers like Facebook and Twitter are competing to broadcast Sports games, but are not generally interested in "conventional TV programs."

75 *Horowitz Corrected Testimony*, p. 3.

76 See *Horowitz Corrected Testimony*, p. 5.

69. Table 11, below, presents a comparison of the results of the Horowitz and Bortz surveys with the results of my regression analysis and Dr. Crawford's regression analysis. As the Table shows, while the Bortz survey matches the regression results well, the Horowitz surveys fail to match the regression results, particularly for the most important, high value categories.[77] The Bortz surveys, my regression analysis and the Crawford regression analysis all imply the same rank order for the top 4 categories: Sports, Program Suppliers, CTV and PTV, in that order. The Horowitz surveys, in contrast, rank these categories as: Program Suppliers, Sports, PTV and CTV, thus failing to match the regression results.

70. It is also notable that the Bortz surveys, my regression analysis, and the Crawford regression analysis all value Sports within roughly 3 percentage points of each other, while the Horowitz valuation (30.0 percent) is 5 percentage points below the lowest, and 8 percentage points below the highest valuation from the other studies. For Program Suppliers, the Horowitz surveys (39.0 percent) are 8 percentage points above the highest of the three analyses, and 12 percentage points above the lowest, whereas Bortz, Israel and Crawford are within roughly 4 percentage points of each other.

[77] For ease of comparison, I present a royalty-weighted average of the Horowitz survey results. Indeed on a year-by-year basis, some of the Horowitz survey results are even more extreme than this average. See *Horowitz Corrected Testimony*, p. 16, Table 3.2.

Table 12: Comparison of Bortz, Israel, Crawford and Horowitz Results

	Implied Share of Royalties			
Claimant Group	**Israel**	**Crawford**	**Bortz**	**Horowitz average**
Sports	37.5%	35.1%	38.2%	30.0%
Program Suppliers	26.8%	23.4%	31.0%	39.0%
CTV	22.2%	19.5%	20.6%	12.6%
PTV	13.5%	17.0%	5.1%	13.2%
Devotional	0.0%	0.7%	4.6%	4.7%
Canadian	0.0%	4.2%	0.5%	0.6%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Israel Testimony, December 22, 2016, Table V-2;
Crawford Corrected Testimony, April 11, 2017, Figure 20.
Bortz Testimony, December 22, 2016, Table I-1.
Horowitz Testimony, December 22, 2016, Table 3.2

Notes: Israel analysis spans 2010-2012;
Crawford analysis spans 2010-2013;
Bortz analysis spans 2010-2013.
Horowitz analysis spans 2010-2013.

71. The failure of the Horowitz survey to match actual marketplace evidence, as reflected in the regression results, is not surprising given the flaws in the Horowitz survey laid out by Mr. Trautman and Dr. Mathiowetz in their testimony.[78] In particular, the anomalously high value accorded to Program Suppliers in the Horowitz surveys supports Mr. Trautman's conclusion that the Horowitz surveys tend to bias respondents to overvalue Program Suppliers programming.

72. Finally, I note the fact that my regression analysis, as well as Dr. Crawford's, correctly allocates the minutes in Mr. Horowitz's "Other Sports" category into the appropriate Agreed Categories (including attributing any program that would be included in Mr. Horowitz's "Other Sports" category to Program Suppliers), and yet still closely

[78] See *Trautman Corrected Rebuttal Testimony*, pp. 12-28; *Mathiowetz Rebuttal Testimony*, pp. 15-27.

matches the values found in the Bortz survey, refutes Mr. Horowitz's claim that the Bortz survey is somehow invalidated by not accounting for the Other Sports minutes correctly.[79]

G. DR. GEORGE'S TESTIMONY ON BEHALF OF CANADIAN CLAIMANTS IS FLAWED, AND A CORRECTED ANALYSIS SHOWS LOWER VALUATIONS FOR CANADIAN PROGRAMMING

73. Dr. George performs a regression analysis that "shares many features of the regression model presented by Dr. Joel Waldfogel in the 2004-05 proceeding," but which she says is "modified to focus more precisely on the value of Canadian Claimant programming."[80] She concludes that the value of an additional minute of Canadian programming is worth roughly $0.089 within the "Canadian region" of cable operators, and estimates that Canadian Claimants should receive approximately 7.11 percent of the royalty fund.[81]

74. Importantly, in reaching her conclusions, Dr. George simultaneously makes two main modifications to the Waldfogel methodology, without indicating which drives her results:

- First, for her regression analysis, she limits her sample to those cable systems which reside in what she calls the "Canadian region."[82] Using this sample, she estimates an implied share of the royalty fund for Canadian Claimants for those

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79 See *Horowitz Corrected Testimony*, p. 5.

80 Written Direct Statement of Lisa M. George, *In re Distribution of Cable Royalty Funds*, December 15, 2016 (hereinafter, *George Testimony*), p. 1. Dr. George amended her testimony on March 8, 2017 (hereinafter, *George Amended Testimony*), and then issued corrections to both the *George Testimony* and the *George Amended Testimony* on May 17, 2017 (hereinafter, *George Corrected Amended Testimony and George Corrected Testimony*).

81 *George Corrected Amended Testimony*, Amended Table 3, p. 6. Dr. George expresses the value of an additional minute of Canadian programming in thousands, at $88.88 per 1,000 minutes.

82 Dr. George defines the Canadian region to include both systems that are in the "Canadian Zone" (i.e., the geographic area within which CSOs are permitted to retransmit Canadian signals under the statutory license) and systems "absorbed into the zone through merger." *George Corrected Amended Testimony*, p. 1.

cable systems, and then prorates that share to account for cable systems outside the Canadian region.[83]

- Second, for her programming data, she only separately categorizes programming that appears on Canadian distant signals and lumps all other programming into a single category called "Compensable Minutes on US Distant Signals".[84]

75. Dr. George focuses her discussion on her choice to limit her sample to only those cable systems that are able to carry Canadian signals, but this is not actually what drives her results. Instead what drives those results for Canadian Claimants is her decision to lump the vast majority of programming into a single "Compensable Minutes on US Distant Signals" category. If one instead properly accounts for the specific programming category into which each minute falls, then even when only considering cable systems in the Canadian region, one finds a royalty share for Canadian Programming that is in line with the results of the Bortz surveys. Hence, Dr. George's higher Canadian share is driven by *only* separately counting minutes on Canadian signals (which is the only source of Canadian minutes), while using a much noisier measure of minutes in other categories. That is, her results are driven by many important variables on the number of minutes by each other category, thus subjecting her regression to omitted variable bias, not by limiting analysis to the "Canadian region."[85]

76. In addition to correcting Dr. George's regression analysis, I have also corrected her calculation for estimating the share of royalties to conform more closely to Dr.

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83 *George Corrected Testimony,* p. 22.

84 *George Corrected Testimony,* p. 21.

85 In Appendix C to my testimony, I estimated a model with only two variables concerning the Agreed Categories: 1) Sports programming and 2) Non-Sports programming. As I said in my testimony, by focusing on the result of Sports programming, this "model sensitivity is intended to test whether the value for Sports minutes is sensitive to splitting out the individual programming categories." My key conclusion was that my finding of high Sports value *was not* affected by this alternative categorization, meaning that it was robust to such change in categories. Hence this finding was the opposite of Dr. George's result, which holds *only if* the programming categories are collapsed and does not hold in a more complete model.

Waldfogel's original method, listed in this table as "Corrected Canadian Royalty Share". Dr. George includes negative coefficient values, such as her estimate for Program Suppliers programming on Canadian signals, in her calculation, rather than setting them to zero, which distorts the royalty shares for categories with positive coefficients. I also remove the weighting scheme that Dr. George used in her calculation, which weighted results by the number of subscribers at each CSO. The Waldfogel-type regression method estimates the royalties per CSO, not the royalties per subscriber, as a function of the CSO's distant signal programming and various control variables. Weighting the total CSO minutes by subscriber is therefore not an appropriate use of the output of this regression, because the functional form of the regression assumes that royalties are measured per CSO, not per subscriber. As a result of these changes to Dr. George's royalty share calculation, even using Dr. George's own regression results yields only a 3.95 percent share of the total royalty pool for Canadian programming.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on ~~September 14, 2017.~~February 12, 2018.

Mark A. Israel

TECHNICAL APPENDIX

V. TECHNICAL APPENDIX: THE DETAILS OF DR. GEORGE'S REGRESSION ANALYSIS

1. Table 13, below, compares:

   1) Dr. George's original base regression results

   2) Dr. George's regression, breaking out all Agreed Categories (by using the measure of minutes from the data used in my regression).[86]

[86] As I only have programming data categorized for 2010-12, this sample excludes the year 2013. Full regression results and implied royalty share calculations for all Agreed Categories are provided in my underlying documents.

Table 13: Regression Models Concerning the Canadian Region

	(1)	(2)
	George Base Model (2010-2013)	**George Model with Individual Programming Categories (2010-2012)**
Corrected Canadian Royalty Share	3.95%	1.48%
Dr. George's Calculation of Canadian Royalty Share	7.11%	2.25%
Minutes of Canadian Programming		0.371**
		(0.148)
Minutes of Commercial TV Programming		1.100***
		(0.384)
Minutes of Devotional Programming		0.141
		(0.338)
Minutes of Program Suppliers Programming		0.0227
		(0.150)
Minutes of Public Broadcasting Programming		1.553***
		(0.291)
Minutes of Sports Programming		7.633**
		(3.527)
Minutes of Other Programming		1.634***
		(0.586)
Minutes of Network Programming		1.132***
		(0.429)
Distant Canadian Signals - Wtd. Canadian Minutes (1,000)	88.88***	
	(32.92)	
Distant Canadian Signals - Wtd. Sports Minutes (1,000)	906.8	
	(774.1)	
Distant Canadian Signals - Wtd. Program Supplier Minutes (1,000)	-293.8**	
	(121.0)	
Distant Domestic Signals - Wtd. Total Minutes (1,000)	44.09***	
	(5.294)	
Observations	2,198	1,657
R-squared	0.861	0.854

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. As column (2) of Table 13 shows, estimating Dr. George's model with controls for all programming categories (thus avoiding omitted variable bias)—but still limiting analysis only to CSOs from the Canadian region—yields an estimate for Canadian programming of roughly 1.48 percent of the total royalty fund. This result is much smaller

than Dr. George's own finding of 7.11 percent for Canadian programming's royalty share, and much closer to the Bortz surveys' estimate of 0.5 percent.

3. As seen in the second column of Table 13, the values on many other categories of programming are quite different from my base model when restricted to the Canadian region. This is, however, in no way a refutation of my base results, which correctly reflect the full set of CSOs. Finding different results when restricting only to a small, non-randomly selected set of CSOs is not surprising, but is also irrelevant to the question of the appropriate values, reflecting the full set of CSOs.

VI. TECHNICAL APPENDIX: DR. GRAY'S TABLE 1

4. Table 14, below, compares the results of Dr. Gray's Table 1 to the results of his analysis but without the use of his sampling weights. The results for JSC programming in particular are very similar between the two versions.

Table 14: Comparison of Weighted and Unweighted Gray Table 1 Results

	Share of All Retransmissions							
	Original Gray Table 1				Unweighted Gray Table 1			
	2010	2011	2012	2013	2010	2011	2012	2013
Canadian Claimants	0.5%	1.4%	1.5%	0.8%	3.4%	4.0%	6.3%	5.7%
Commercial Television	11.7%	10.2%	14.6%	14.4%	11.5%	11.0%	12.2%	10.7%
Devotionals	7.8%	12.1%	5.4%	6.9%	5.2%	4.7%	2.3%	2.8%
Program Suppliers	55.5%	54.0%	38.3%	50.7%	45.5%	43.7%	34.2%	37.3%
Public Television	24.5%	22.1%	40.1%	26.9%	34.2%	36.4%	44.9%	43.3%
JSC	0.2%	0.2%	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%
	Share of All Volume							
	Original Gray Table 1				Unweighted Gray Table 1			
	2010	2011	2012	2013	2010	2011	2012	2013
Canadian Claimants	0.5%	1.8%	1.3%	0.8%	3.1%	3.9%	5.7%	5.3%
Commercial Television	12.8%	11.8%	18.5%	14.2%	12.8%	12.5%	14.6%	11.2%
Devotionals	8.1%	11.5%	5.3%	6.4%	5.2%	4.5%	2.3%	3.0%
Program Suppliers	53.5%	52.1%	35.8%	52.1%	43.6%	41.2%	31.5%	36.1%
Public Television	24.4%	22.1%	38.6%	25.8%	34.6%	37.2%	45.3%	43.7%
JSC	0.7%	0.7%	0.5%	0.8%	0.7%	0.7%	0.5%	0.7%

Source: Gray 2nd Corrected and Amended Table 1 and Backup Materials, January 22, 2018.

Document comparison by Workshare 9 on Monday, February 12, 2018 10:55:54 PM

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Legend:	
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Moved to	
Style change	
Format change	
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Inserted cell	
Deleted cell	
Moved cell	
Split/Merged cell	
Padding cell	

Statistics:	
	Count
Insertions	19
Deletions	16
Moved from	0
Moved to	0
Style change	0
Format changed	0
Total changes	35

JOINT SPORTS CLAIMANTS' REDACTION LOG FOR AMENDED WRITTEN REBUTTAL TESTIMONY

In re Distribution of Cable Royalty Funds, No. 14-CRB-0010-CD (2010-13)

Document	Page Number	Basis For Redaction	Description of Redacted Information
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	11	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	15	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty	16	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data

Document	Page Number	Basis For Redaction	Description of Redacted Information
Judges			
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	17	Contains confidential, proprietary Nielsen data.	Nielsen NPM data on distant viewing of compensable programming on WGNA.
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	18	Contains confidential, proprietary Nielsen data.	Nielsen NPM data on distant viewing of compensable programming on WGNA.

Document	Page Number	Basis For Redaction	Description of Redacted Information
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	19	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	20	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	21	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data

Document	Page Number	Basis For Redaction	Description of Redacted Information
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	22	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	26	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	27	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data

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William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	28	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	32	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data
William E. Wecker Associates, Inc. Analysis of Written Direct Testimony of Jeffrey S. Gray, Ph.D. in the 2010-13 Cable Royalty Proceeding Before the Copyright Royalty Judges	37	Contains Lindstrom/Nielsen data that Program Suppliers designated as RESTRICTED	Lindstrom/Nielsen NPM Data

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Certificate of Service

I hereby certify that on Tuesday, February 13, 2018 I provided a true and correct copy of the Written Rebuttal Statement - Amended on Written Rebuttal Statement, Vol. 2-PUBLIC to the following:

SESAC, Inc., represented by Christos P Badavas served via Electronic Service at cbadavas@sesac.com

American Society of Composers, Authors and Publishers (ASCAP), represented by Sam Mosenkis served via Electronic Service at smosenkis@ascap.com

Spanish Language Producers, represented by Brian D Boydston served via Electronic Service at brianb@ix.netcom.com

National Public Radio, Inc. (NPR), represented by Gregory A Lewis served via Electronic Service at glewis@npr.org

Public Broadcasting Service (PBS), represented by Ronald G. Dove Jr. served via Electronic Service at rdove@cov.com

Multigroup Claimants, represented by Brian D Boydston served via Electronic Service at brianb@ix.netcom.com

MPAA-represented Program Suppliers, represented by Lucy H Plovnick served via Electronic Service at lhp@msk.com

Broadcast Music, Inc. (BMI), represented by Janet Fries served via Electronic Service at janet.fries@dbr.com

Canadian Claimants Group, represented by Victor J Cosentino served via Electronic Service at victor.cosentino@larsongaston.com

National Association of Broadcasters (NAB), represented by David J Ervin served via Electronic Service at dervin@crowell.com

Devotional Claimants, represented by Arnold P Lutzker served via Electronic Service at arnie@lutzker.com

Signed: /s/ Robert A Garrett